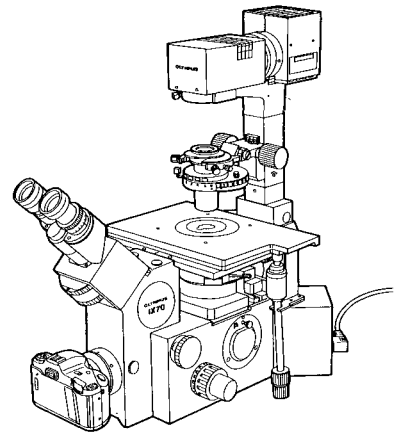


# OLYMPUS®



## INSTRUCTIONS IX50/IX70 INVERTED SYSTEM MICROSCOPE

This instruction manual is for the Olympus Inverted System Microscope Models IX50 and IX70. To ensure the safety, obtain optimum performance, and to familiarize yourself fully with the use of this microscope, we recommend that you study this manual thoroughly before operating the microscope. Retain this instruction manual in an easily accessible place near the work desk for future reference.



A X 7 0 6 6

# IMPORTANT

The IX system comprises two basic microscope frames, the IX50 and the IX70. Various modules, such as illumination column, stages, condensers, etc. are available for upgrading the system. This instruction manual introduces the basic system. Explanations relating to particular modules are preceded by a heading stating the name of the module. Please study carefully the relevant sections dealing with the modules you have already purchased.

This IX50 and IX70 units feature a UIS (universal infinity system) optical design, and should be used only with UIS eyepieces, condensers, etc. Less than optimum performance may result if inappropriate accessories are used.

## Precautions When Unwrapping the Microscope

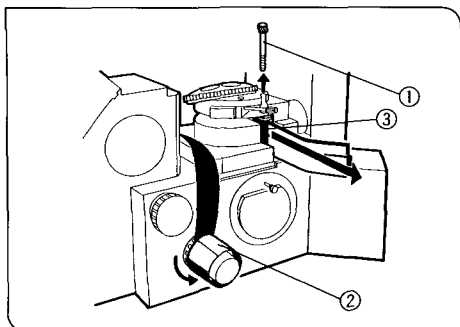


Fig. 1

1. Before use, using the Allen wrench provided with the microscope frame, loosen the screw ① securing the clamping rod holding the focusing controls clamped to protect them during transport. (Fig. 1)
2. Remove the screw and the caution tape ② around the focusing adjustment knobs. Then rotate the coarse adjustment knob counterclockwise (in the direction of the arrow), and remove the rod ③ holding the focusing controls. (Fig. 1)

When moving the microscope, insert a thick sheet of paper, etc. into the space left by the clamping rod between the revolving nosepiece and the dummy cover (or cube cassette) and turn the coarse adjustment knob clockwise to prevent the focusing block from moving.

★ **Never attempt to turn the coarse adjustment knob clockwise while the rod for clamping the focus controls remains in place.**

3. Before moving the stage, clamp the flexible knob to prevent it from being damaged.

## ⚠ Safety Precautions

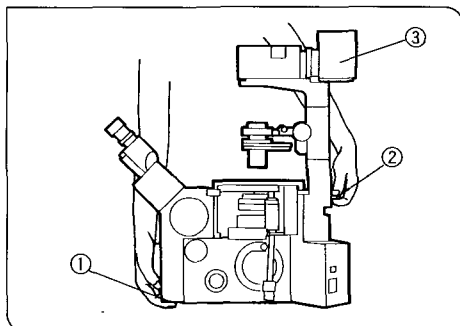


Fig. 2

1. Install the microscope on a sturdy, level table or bench. (Weight: IX70 approximately 28 kg (62 lb.); IX50 approximately 27 kg (59.5 lb.))
2. The surfaces of the lamp housing ③ on the illumination column will become extremely hot during operation. When installing the microscope, make sure to allow ample free space around and in particular above and below the lamp housing. (Fig. 2)
3. When moving the microscope, grip at the designated position ① and the handle ② on the illumination column IX-ILL100 (the IXILL30 has a groove instead of the handle). (Fig. 2)

★ **Damage to the microscope may occur if you grasp it by the lamp housing or the binocular eyepiece section.**

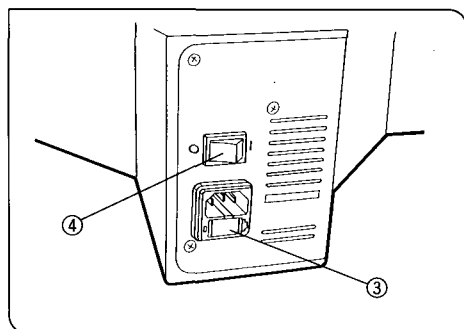


Fig. 3

4. To avoid potential shock hazards and burns, first set the main switch ④ to "○" (OFF) and then disconnect the power cord from the wall outlet before replacing the bulb and fuses ③. Whenever you replace the bulb during use or right after use, allow the lamp housing and bulb to cool before touching. (Fig. 3)

Designated bulb	IX70 (IX-ILL100LH) 12V, 100W/HA-L (PHILIPS 7724)
	IX50 (IX-ILL30) 6V, 30W/HA (PHILIPS 5761)
Designated fuse	IX70 (IX-ILL100LH) ⊞ T5A (H) 250V (LITTLEFUSE 215005)
	IX50 (IX-ILL30) ⊞ T3.15A (H) 250V (LITTLEFUSE 2153.15)

**Use of improper bulb or fuse could result in a fire.**

5. Always use the power cord provided by Olympus. If no power cord is provided, please select the proper power cord by referring to the section "PROPER SELECTION OF THE POWER SUPPLY CORD" at the end of this instruction manual.  
If the proper power cord is not used, product safety and performance cannot be guaranteed.
6. Always ensure that the ground terminal of the microscope and that of the wall outlet are properly connected. If the equipment is not grounded, Olympus can no longer warrant the electrical safety and performance of the equipment.
7. Never insert metal objects, etc. into the air vents of the microscope frame as this could result in electrical shock and personal injury.

### Safety Symbols

The following symbols are found on the microscope. Study the meaning of the symbols, and always use the equipment in the safest possible manner.

Symbol	Explanation
	Indicates that the surface becomes hot, and should not be touched with bare hands.
	Before use, carefully read the instruction manual. Improper handling could result in injury to the user and/or damage to the equipment.
	Indicates a potential fire hazard; when replacing fuses, be sure replacement fuse is of the specified rating.
	Indicates that the main switch is ON.
	Indicates that the main switch is OFF.

## Warnings

Warning engravings are placed at parts where special precaution is required when handling and using the microscope. Always heed the warnings.

Warning engraving position

Lamp housing

Warning against high temperature

## 1 Getting Ready

1. A microscope is a precision instrument. Handle it with care and avoid subjecting it to sudden or severe impact.
2. Do not use the microscope where it is subjected to direct sunlight, high temperature and humidity, dust, or vibrations. (For operating conditions, refer to Section 9, SPECIFICATIONS on page 53.)
3. Always use the tension adjustment ring to adjust the tension of the coarse adjustment knob.
4. In case of the IX50, make sure that the line voltage selector switch located at the rear of the microscope is set to conform with the local mains voltage.

© When shipped from the factory, the switch is set to 220-240V.

## 2 Maintenance and Storage

1. Clean all glass components by wiping gently with gauze. To remove fingerprints or oil smudges, wipe with gauze slightly moistened with a mixture of ether (70%) and alcohol (30%) or EE System Cleaner (Olympus EE-6310).  
**⚠** Since solvents such as ether, alcohol and EE-6310 are highly flammable, they must be handled carefully. Be sure to keep these chemicals away from open flames or potential sources of electrical sparks — for example, electrical equipment that is being switched on or off. Also remember to always use these chemicals only in a well-ventilated room.
2. Do not attempt to use organic solvents to clean the non-optical components of the microscope. To clean these, use a lint-free, soft cloth lightly moistened with a diluted neutral detergent.
3. When handling fluids, e.g., culture solutions, be careful not to spill these. If fluids are spilled, immediately set the main switch to "O" (OFF) and disconnect the power cord and wipe off objectives and any fluid running below these. Pay special attention to the dust cover glass below the revolving nosepiece and storage hole for the Allen screwdriver on the microscope frame.
4. When objectives are not screwed into the sockets of the revolving nosepiece, seal the sockets with dust caps, which will protect the lenses located in the lower light path from dust, spilled solution, etc.
5. Do not disassemble any part of the microscope as this could result in malfunctions or reduced performance.
6. When not using the microscope, keep it covered with the provided dust cover.
7. To prevent the risk of infection, immediately wipe with disinfectant alcohol after using specimens containing infectious material.

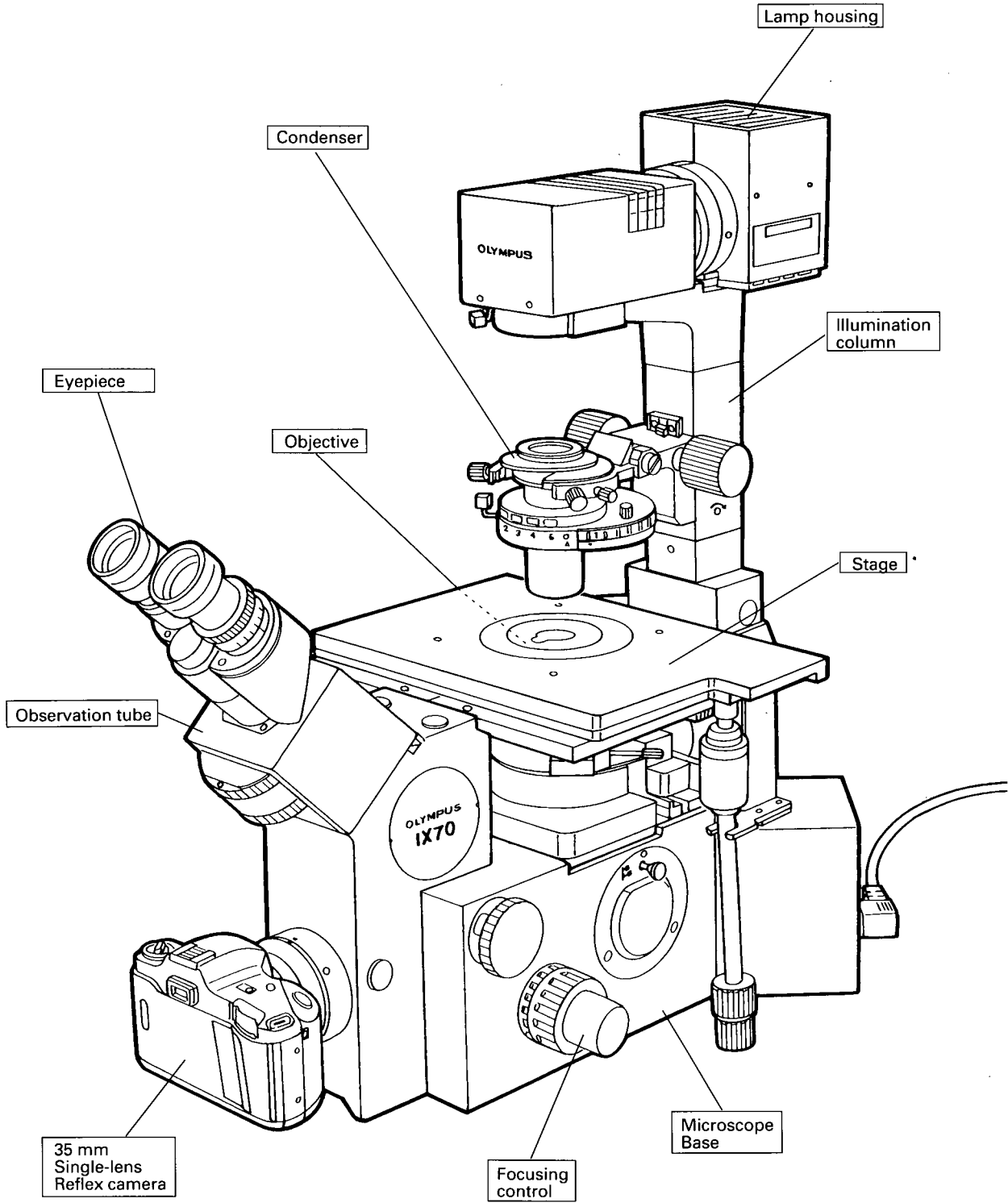
## 3 Caution

If the equipment is used in a manner not specified in this manual, the safety of the user may be imperiled. In addition, the equipment may also be damaged. Always use the equipment as outlined in this instruction manual.

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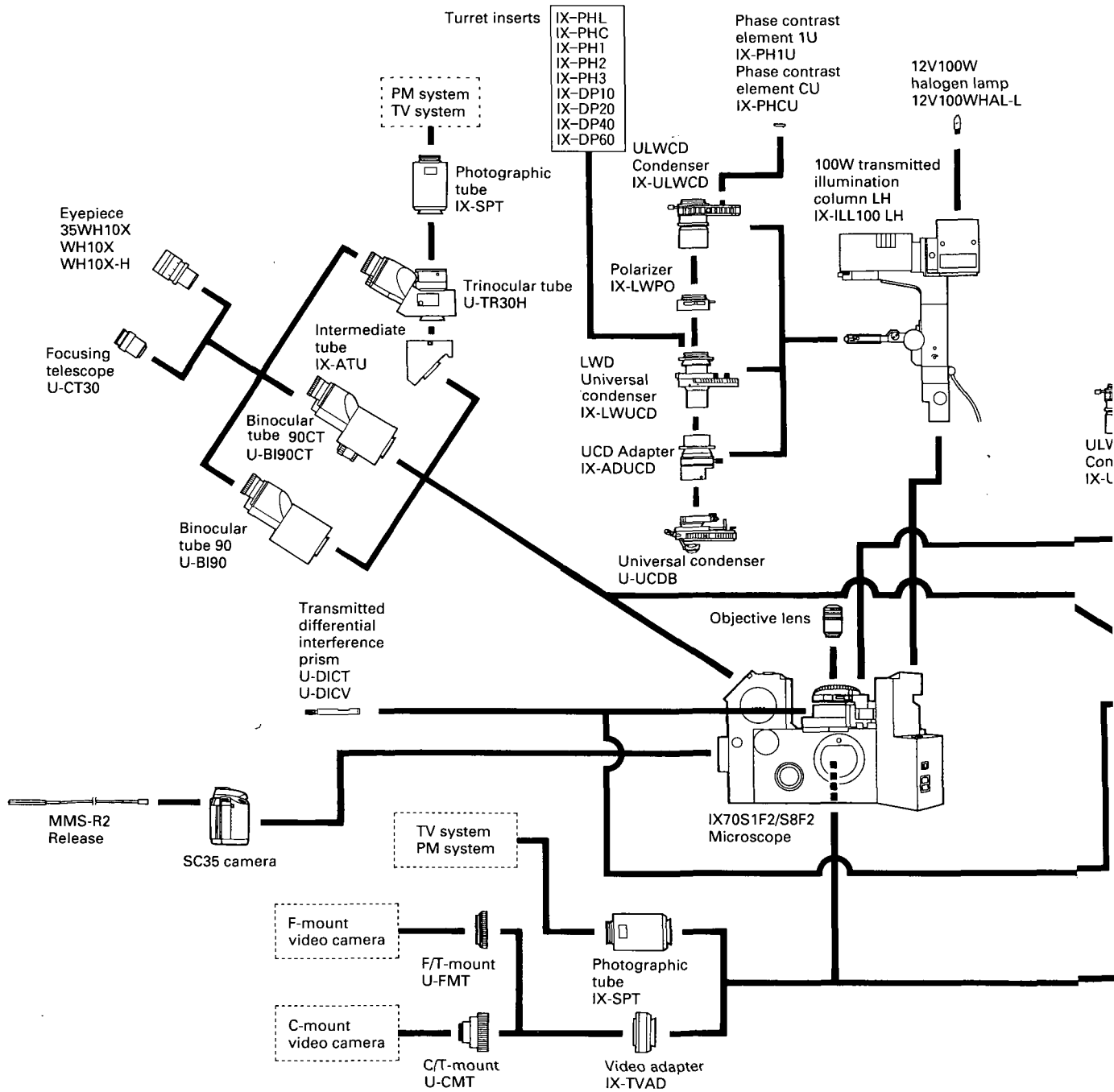
# MODULE NOMENCLATURE

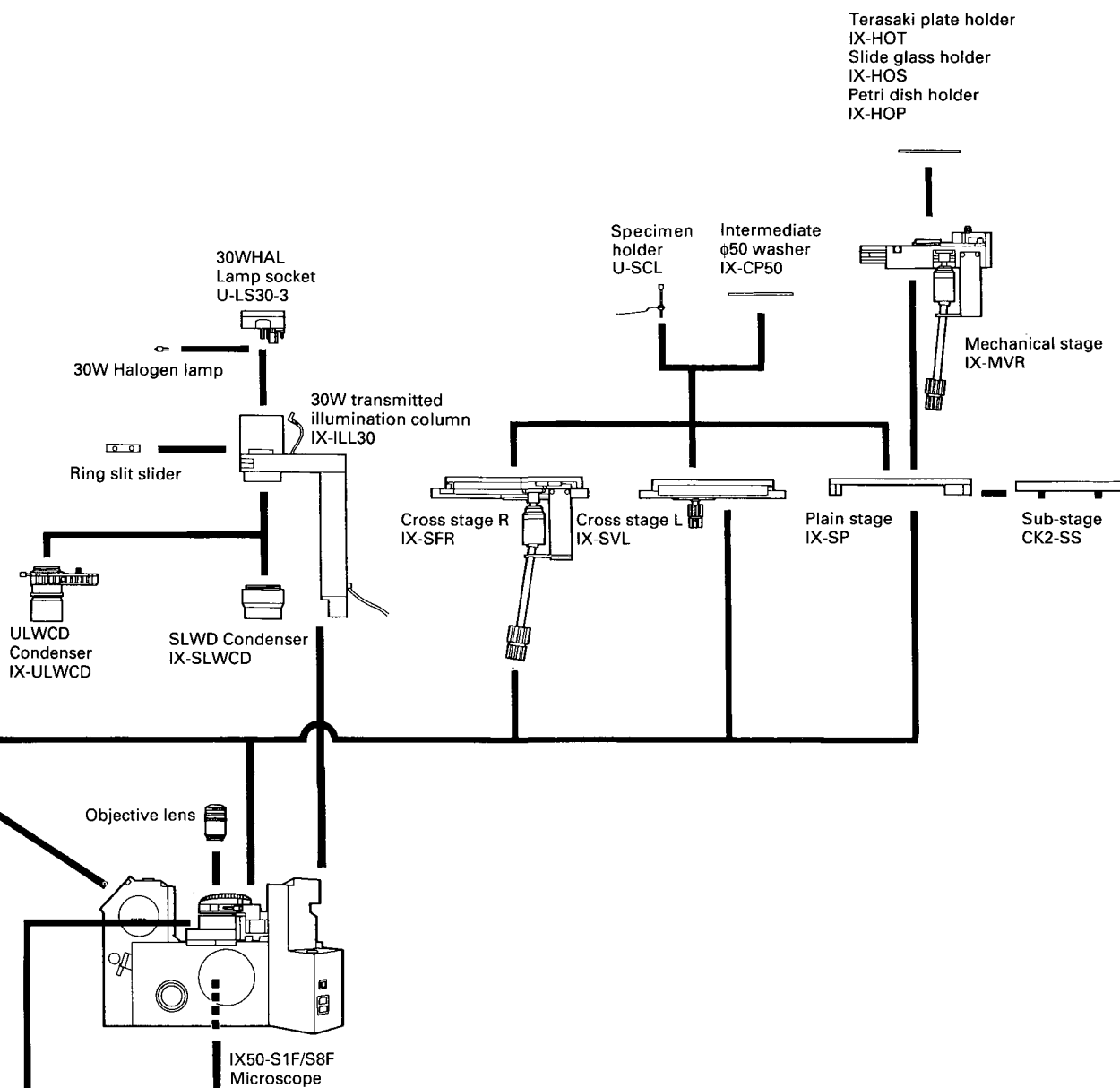




## 2-1 Module System Diagram

The diagram below shows where the various modules should be mounted.

- ★ When assembling, make sure that all parts are free of dust and dirt, and avoid scratching any parts or touching the glass surfaces.
- ★ Before assembling, make sure to prepare all required tools (i.e., Allen screwdriver provided with the microscope frame and the provided Allen wrench).





- Tools**
-  Allen screwdriver (stored inside the microscope frame)
  -  Allen wrench (provided with the microscope frame)



## 2-2 Detailed Assembly Procedure

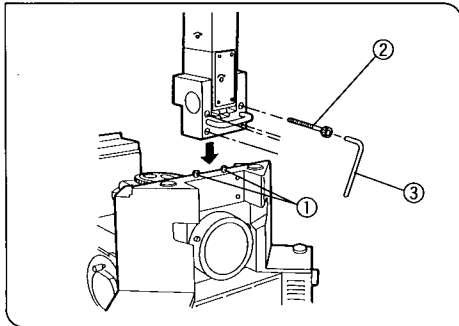


Fig. 4

### 1 Mounting the Illumination Column (Fig. 4)

1. Aligning the guide holes in the illumination column with the two protruding positioning pins ① on the microscope frame, gently place the column onto the microscope frame from above.
2. While pressing down the illumination column with one hand, insert the four provided hexagon socket head screws ② into the screw holes. Then tighten the screws with the provided Allen wrench ③.

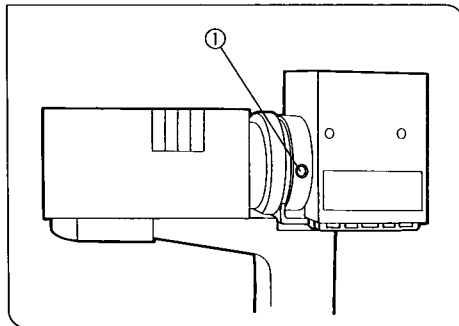


Fig. 5

### 2 Mounting the Bulb and the Lamp Housing (Figs. 5-10)

#### Illumination Column (IX-ILL100LH)

(Figs. 5-7)

◎ The designated bulb is a 12V, 100W HAL-L halogen bulb (PHILIPS 7724).

1. Using the Allen screwdriver, loosen the clamping screw ① on the right side of the lamp housing and detach the lamp housing. (Fig. 5)
2. Holding the bulb with a piece of gauze to avoid touching it directly with bare hands, depress the bulb clamping levers ② in the direction of the arrow and insert the pins of the bulb ③ fully into the pin holes ④. (Fig. 6)
3. Gently release the bulb clamping levers to their original positions to secure the bulb.

⚠ To prevent reduced bulb life or cracking, do not touch the bulb with bare hands. If fingerprints are accidentally left on the bulb, wipe the bulb with a soft cloth.

#### ⚠ Bulb Replacement During Use or Right After Use

The bulb and the lamp housing surfaces and vicinity will be extremely hot during use and right after use. Set the main switch to "O" (OFF) and disconnect the power cord from the wall outlet. Then allow the old bulb, lamp housing and vicinity to cool before replacing the bulb with a new of the designated type.

4. Using the Allen screwdriver, loosen the clamping screw ① on the right hand side of the lamp housing. Mount the lamp housing horizontally and securely tighten the clamping screw. (Fig. 5)

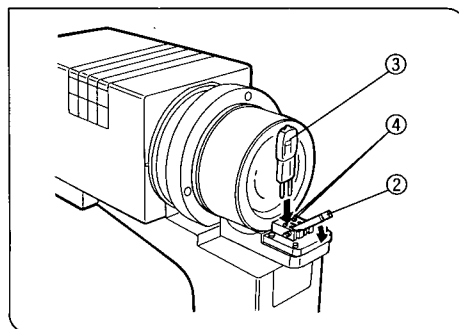


Fig. 6

5. Align the plug ⑤ of the connecting cord extending from the illumination column with the notch in the lamp power output connector ⑥ on the rear of microscope frame and connect them firmly (Fig. 7).

★ The lamp housing and the area in the vicinity of it will become very hot during operation. Ensure that there is ample free space around and in particular above the lamp housing.

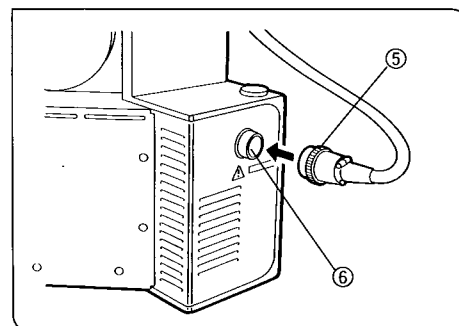


Fig. 7

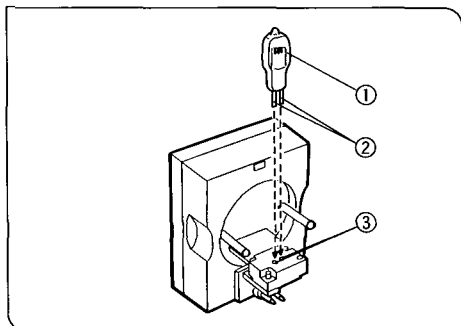


Fig. 8

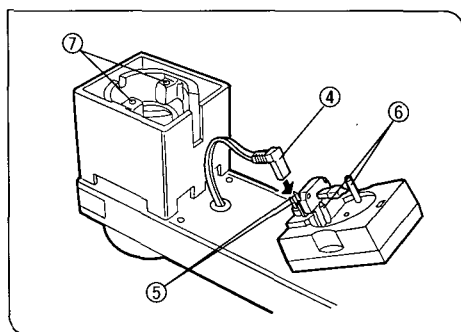


Fig. 9

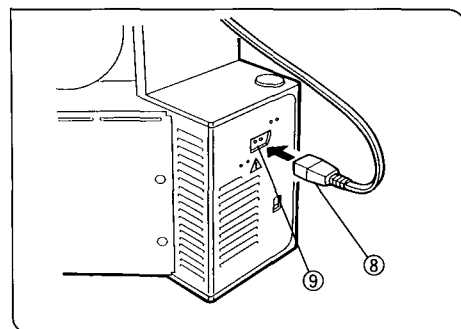


Fig. 10

## Illumination Column (IX-ILL30)

(Figs. 8-10)

⊙ The designated bulb is a 6V, 30W HAL halogen bulb (PHILIPS 5761).

1. Holding the bulb ① with a piece of gauze to avoid touching it directly with bare hands, insert the bulb pins ② fully into the pin holes ③ of the lamp socket. (Fig. 8)

⚠ **To prevent reduced bulb life or cracking, do not touch the bulb with bare hands. If fingerprints are accidentally left on the bulb, wipe the bulb with a soft cloth.**

2. Insert the plug ④ into the socket pin ⑤. Then align the guide pins ⑥ with the guide holes ⑦ on the illumination column, and gently place the lamp socket on the illumination column. (Fig. 9)

⚠ **Bulb Replacement During Use or Right After Use**

The bulb and the lamp housing surfaces and vicinity will be extremely hot during use and right after use. Set the main switch to "O" (OFF) and disconnect the power cord from the wall outlet. Then allow the old bulb, lamp housing and vicinity to cool before replacing the bulb with a new of the designated type.

3. Plug the connecting cord plug ⑧ firmly into the lamp power output connector ⑨ on the rear of the microscope frame. (Fig. 10)

★ The lamp housing and the area in the vicinity of it will become very hot during operation. Ensure that there is ample free space around and in particular above the lamp housing.

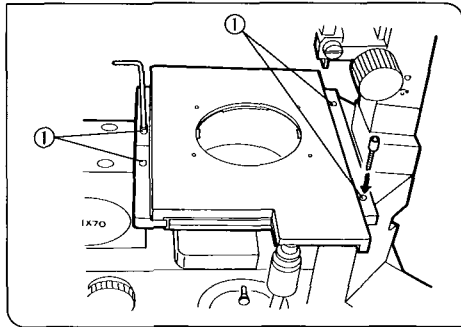


Fig. 11

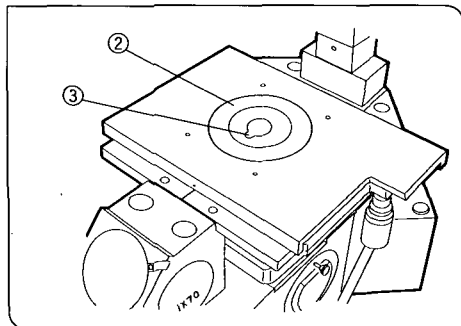


Fig. 12

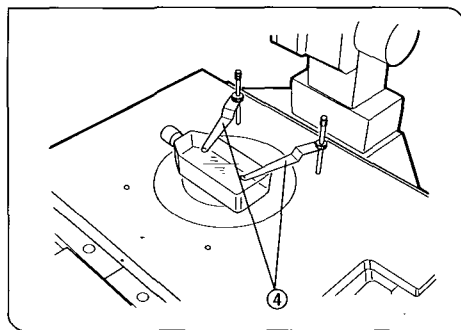


Fig. 13

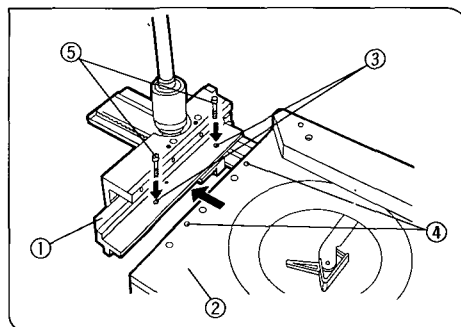


Fig. 14

### 3 Mounting the Stage

(Figs. 11-18)

- ⊙ The stage mounting procedures are the same for the stages IX-SFR, IX-SVL, and IX-SP.
- ⊙ When mounting the mechanical stage (IX-MVR), first attach it to the plain stage (IX-SP). (See page 7.)
- 1. Aligning the stage mounting holes with the threaded holes in the microscope frame, gently place the stage on the frame.
- ⊙ Position the closely spaced stage mounting holes at the front.
- 2. Insert the four provided Allen screws into the mounting holes ①. Tighten the screws with the provided Allen wrench. (Fig. 11)
- 3. Insert the stage insert plate ② into the stage. (Fig. 12)
  - ★ The stage insert plate is designed very thin so that the objective will not hit it when the revolving nosepiece is rotated. Do not subject the stage insert plate to impact or excessive force, as this may deform it.
- ⊙ To facilitate confirmation of the objective front lens position and application of oil for oil immersion objectives, rotate the stage insert plate so that the keyhole ③ will be facing the front. (Fig. 12)
- 4. Screw the stage clips (U-SCL) ④ into the threaded holes provided on the stage surface. (Fig. 13)

#### Attachable Mechanical Stage (IX-MVR)

(Figs. 14-16)

#### « Mounting the Mechanical Stage »

1. Invert the mechanical stage ①. Invert the plain stage (IX-SP) ② and place it on top of the inverted mechanical stage. (Fig. 14)
2. Align the two mounting holes ③ on the mechanical stage with the mounting holes ④ on the plain stage. Insert the two clamping screws ⑤ and tighten with the Allen screwdriver.
  - ★ The mechanical stage may also be attached to the left side of the plain stage. However, this will interfere with the operation of the stage travel knobs, focusing knobs, and the revolving nosepiece. Always attach the mechanical stage on the right side of the plain stage.

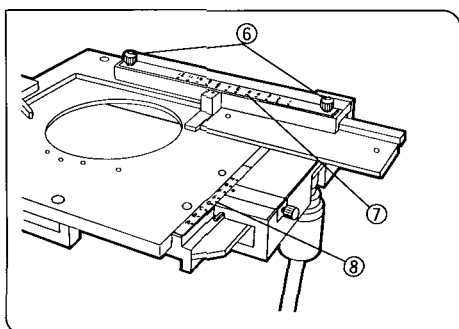


Fig. 15

### « Attaching the Scales »

⊙ Scales for use with a 96-well microtiter plate are provided with the attachable mechanical stage.

1. Loosen the two clamping knobs ⑥ at the top of the stage's X-axis guide. Positioning the scale numerals correctly, place the X-axis scale ⑦ on the guide. Then tighten the clamping knobs. (Fig. 15)
2. Positioning the scale numerals correctly, place the Y-axis scale ⑧ on the top of the stage's Y-axis guide. The scale will be held in place magnetically.

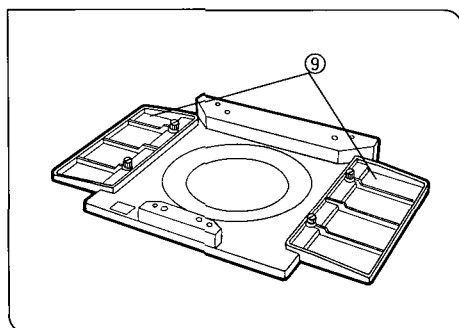


Fig. 16

### « Mounting the Stage Extender Plates (CKS2-SS) »

Mount these plates in the same manner as outlined in "Attachable Mechanical Stage (IX-MVR)" above. (See page 6)

⊙ When the mechanical stage is not used, a stage extender plate ⑨ can be mounted at both sides of the plain stage. (Fig. 16)

### « Mounting the Positioning Bracket »

⊙ Flexible stalks for the coaxial X-Y movement knobs are employed in the case of the stage (IX-SFR) and the attachable mechanical stage (IX-MVR). These stages are provided with a positioning bracket that allows the tilt of the stalk to be adjusted to suit the observer's preference.

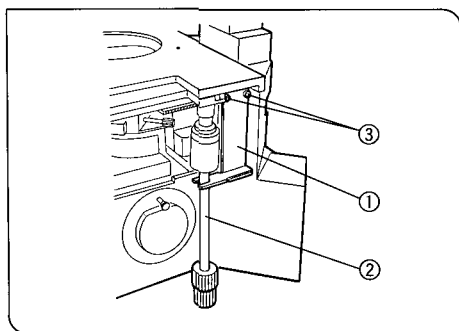


Fig. 17

#### Stage (IX-SFR)

(Figs. 17, 18)

1. Insert the stalk ② of the flexible X-Y movement knobs into the U-shaped notch in the positioning bracket ①. (Fig. 17)
2. Using the Allen screwdriver, tighten the clamping screw ③ of the bracket lightly to the stage.
3. Align the stage's center alignment index line ④ with the edge of the upper stage ⑤. (Fig. 18)
4. Slide the positioning bracket to and fro in order to determine the most convenient stalk angle.
5. Tighten the clamping screw ③.

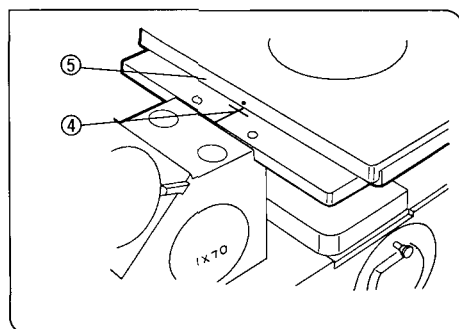


Fig. 18

#### Attachable Mechanical Stage (IX-MVR)

- Is attached in the same manner as outlined in "Stage (IX-SFR)" above. The attachable mechanical stage, however, is not provided with a stage center alignment index line. Instead turn the Y-axis travel knob to bring the stage into the center.

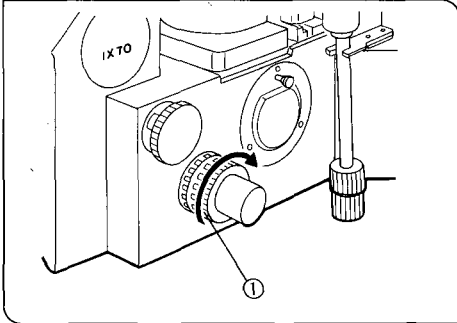


Fig. 19

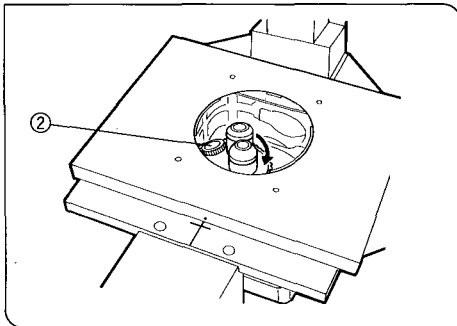


Fig. 20

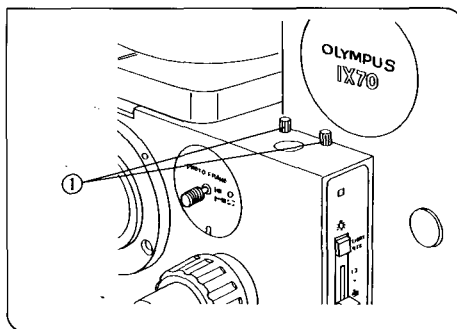


Fig. 21

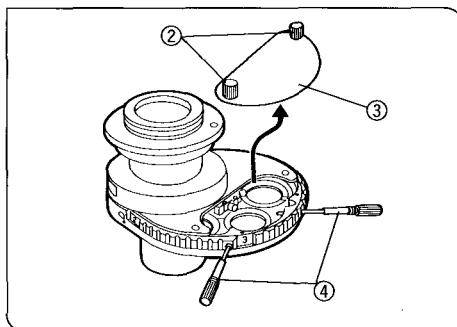


Fig. 22

#### 4 Mounting the Objectives

(Figs. 19, 20)

1. Turn the coarse adjustment knob ① in the direction of the arrow to lower the revolving nosepiece. (Fig. 19)

2. Remove the stage insert plate and mount the objectives through the hole in the stage left by the stage insert plate.

⊙ Mount the objectives on the revolving nosepiece in such a manner that the magnification increases from low to higher powers in a clockwise direction.

★ In the inverted microscope, the front lens of the objective faces upward, and is more exposed to contamination than the objective of an upright microscope. Therefore, if there are empty sockets in the nosepiece, attach the dust caps ② provided. (Fig. 20)

#### 5 Mounting the Condenser Turret Inserts

(Figs. 21 – 28)

- ⊙ The turret insert centering wrenches ① provided with the condenser may be conveniently stored in the storage holes provided on the microscope frame. (Fig. 21)

#### Universal Condenser (IX-LWUCD)

(Figs. 22 – 26)

- ⊙ See page 51, "TURRET INSERTS AND COMPATIBLE OBJECTIVES", for details on the various combinations.

#### 《 Mounting the Phase Contrast Ring Slit Insert 》

1. Position the condenser as shown in Fig. 22. Loosen the two clamping screws ② and remove the cover ③.
2. Rotate the turret so that the number of the insert that is to be mounted becomes visible in the opening.
3. Put the turret insert centering wrenches ④ into the designated insert centering holes and turn the wrenches counterclockwise. (Fig. 22)

⊙ See page 51, "TURRET INSERTS AND COMPATIBLE OBJECTIVES" for turret opening diameters and compatible turret inserts.

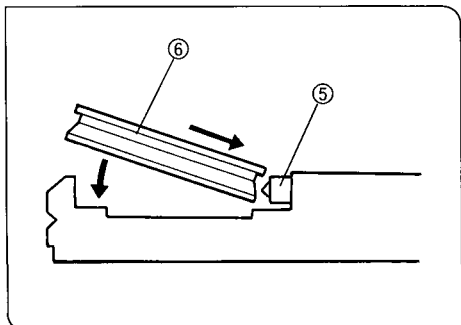


Fig. 23

4. While depressing the spring (5) on the inward side of the turret aperture with the side of the phase contrast ring slit mount (6), insert the phase contrast ring slit completely until it sits firmly on the bottom of the turret aperture. (Fig. 23)

★ Be careful not to press against the ring slit glass plate in its mount.

5. Turn the turret insert centering wrenches clockwise to tighten lightly.  
 ★ If the centering wrenches are engaged, the turret cannot be rotated.  
 ★ Do not tighten the centering wrenches excessively as this may deform the insert mount.

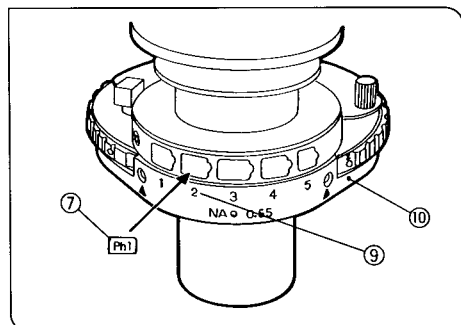


Fig. 24

6. Attach the index sticker (7) which comes with the insert at the index number (9) position that corresponds to the number (8) into which the turret insert was placed. (Figs. 24, 25)

⊙ The turret insert corresponding to the number indicated by the • symbol (10) is engaged into the light path. (Fig. 25)

⊙ Remove the turret insert index sticker with the tip of a ball-pen or mechanical pencil.

7. When all the turret inserts have been mounted, mount the cover and tighten the two clamping screws.

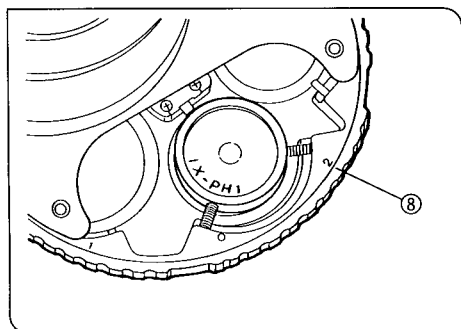


Fig. 25

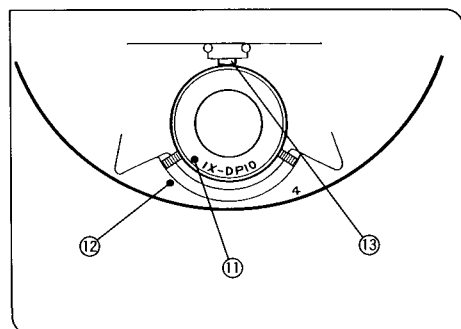


Fig. 26

#### « Mounting the Differential Interference Contrast Prism Insert »

1. Follow steps 1, 2, and 3 in the above paragraph.  
 2. Aligning the positioning dot (11) of the DIC prism insert with the positioning dot (12) of the turret aperture, drop the DIC prism insert into the turret aperture as far as it will go in a manner so that the positioning pin of the DIC prism insert fits into the pin hole. Slightly depress the spring (13) on the inward side of the turret aperture with the side of the DIC prism insert mount when inserting. (Fig. 26)

★ Be careful not to touch the prism in its mount.

★ Do not tighten the centering wrenches excessively as this may deform the prism mount.

3. Follow steps 5, 6, and 7 in the above paragraph.

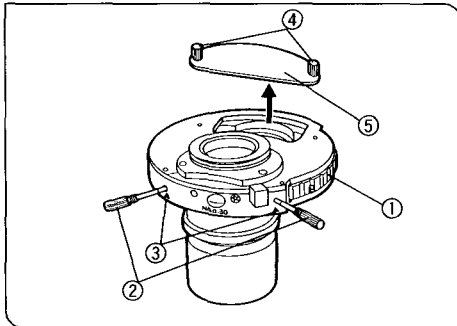


Fig. 27

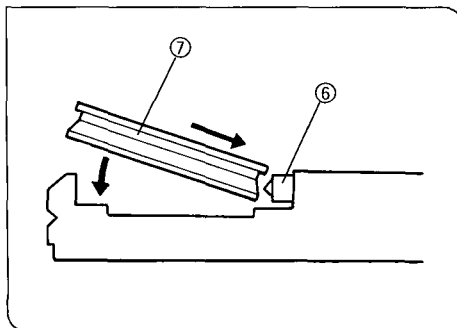


Fig. 28

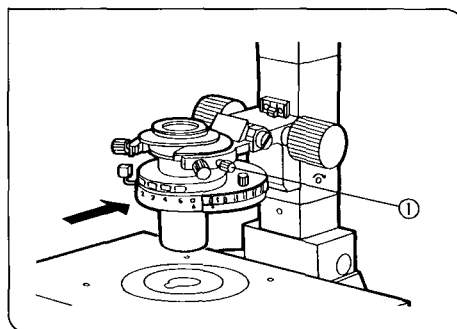


Fig. 29

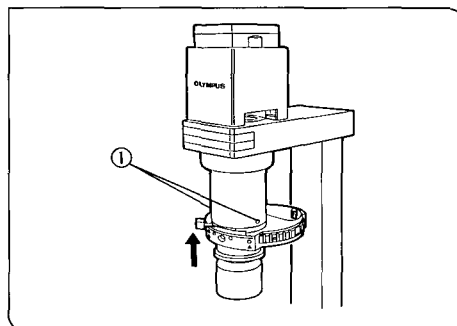


Fig. 30

**Condenser (IX-ULWCD)**

(Figs. 27, 28)

**« Mounting the Phase Contrast Ring Slit Insert »**

1. Rotate the turret ① to the Ph1/PhC index position. (Fig. 27)
2. Put the turret insert centering wrenches ② into the designated insert centering holes indicated by the ▲ symbols ③. Turn the wrenches counterclockwise to loosen.
3. Rotate the turret to have the BF index appear in the front window.
4. Loosen the two clamping screws ④ and remove the cover ⑤.
5. While depressing the spring ⑥ on the inward side of the turret aperture with the side of the phase contrast ring slit mount (IX-PH1U or IX-PHCU ⑦), insert the phase contrast ring slit mount completely until it sits firmly on the bottom of the turret aperture. (Fig. 28)
  - ★ Be careful not to press against the ring slit glass plate in its mount.
  - ★ Turret inserts other than IX-PH1U or IX-PHCU cannot be used. Only the turret inserts listed above can be replaced. Never attempt to pull out other turret inserts.
6. Rotate the turret to the Ph1/PhC position. Turn the turret insert centering wrenches clockwise to tighten lightly.
  - ★ Do not tighten the centering wrenches excessively as this may deform the insert mount.
7. Attach the cover and tighten the clamping screws.

**6 Mounting the Condenser to the Microscope Frame (Figs. 29-35)****Universal Condenser (IX-LWUCD)**

(Fig. 29)

1. Loosen the condenser clamping knob ①.
2. Insert the condenser into the condenser holder fork dovetail. Push the condenser horizontally onto the condenser holder until the condenser positioning pin is inserted into the positioning groove of the dovetail.
3. Tighten the condenser clamping knob ①.

**Condenser (IX-ULWCD)**

(Figs. 29, 30)

**« When Using Illumination Column (IX-ILL100LH) »**

1. Loosen the condenser clamping knob ①. (Fig. 29)
2. Insert the turret condenser circular dovetail into the condenser holder and tighten the clamping knob.

**« When Using Illumination Column (IX-ILL30) »**

1. Using the Allen screwdriver, loosen the two condenser clamping screws ①. (Fig. 30)
2. Insert the positioning section on the upper portion of the condenser into the hole in the condenser mount adapter as far as it will go.
3. Position the turret index window at the front and tighten the condenser clamping screws ①.

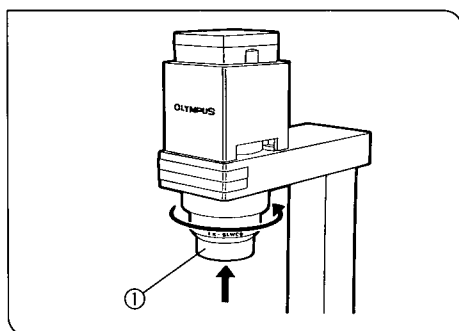


Fig. 31

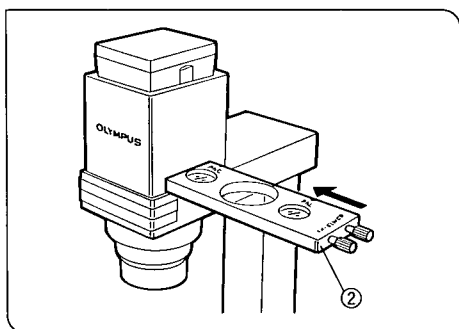


Fig. 32

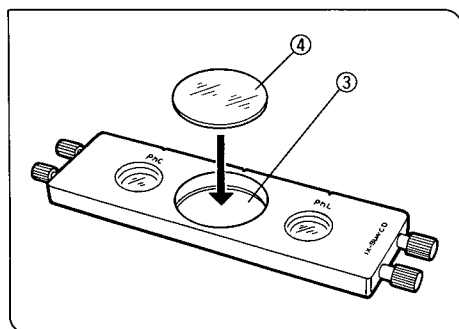


Fig. 33

**Condenser (IX-SLWCD)**

(Figs. 31-33)

- ⊙ This condenser can only be used with the illumination column (IX-ILL30). It consists of a slider and a condenser lens.

**《 Mounting the Condenser 》**

1. If the condenser (IX-ULWCD) mounting adapter is mounted to the arm of the illumination column, rotate the adapter counterclockwise and remove it.
2. Insert the threaded portion of the condenser ① into the illumination column and turn the lens in the direction of the arrow until it comes up against the bracket and is firmly seated. (Fig. 31)

**《 Installing the Ring Slit Slider 》**

- ⊙ Insert the slider into the illumination column (IX-ILL30).
1. Remove the dummy slider from the slider slot on the illumination column. (Fig. 32)
  2. Drop the frosted filter ④ provided with the illumination column into the center aperture ③ of the ring slit slider ②. (Figs. 32, 33)
  3. With the imprinted side of the ring slit slider ② upwards, and the V-groove for the click function towards the rear, insert the slider into the slot. (Fig. 32)



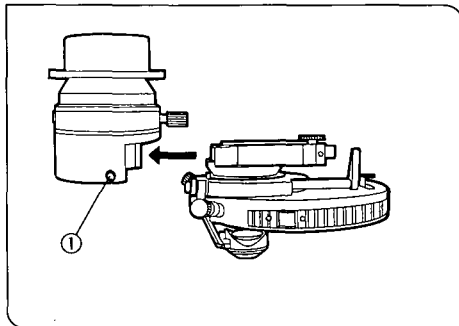


Fig. 34

### Transmitted Light Universal Condenser (U-UCDB) (Figs. 34, 35)

#### « Attaching the Condenser to the UCD Adapter »

1. Using the Allen screwdriver, loosen the two set screws ① on the UCD adapter (IX-ADUCD). (Fig. 34)
2. Insert the transmitted light universal condenser (U-UCDB) horizontally into the adapter until the condenser positioning pin is inserted into the positioning groove of the mounting dovetail.
3. Tighten the two set screws ① with the Allen screwdriver. (Fig. 34)

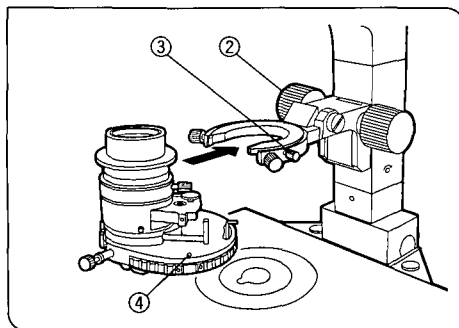


Fig. 35

#### « Attaching to the Illumination Column »

1. Raise the condenser height adjustment knob ② to its upper limit position. (Fig. 35)
2. Loosen the condenser clamping knob ③. (Fig. 35)
3. Insert the mount of the UCD adapter into the condenser holder fork dovetail (the condenser turret should be positioned on the right hand side). Push the condenser horizontally onto the condenser holder until the condenser positioning pin is inserted into the positioning groove of the mounting dovetail.
4. Tighten the condenser clamping knob. (Fig. 35)

#### « Attaching Turret Insert Index Stickers »

- ⊙ If the index stickers are attached as outlined in the instruction manual for the U-UCDB, they will be difficult to see in case of IX. Affix the stickers as follows.
  - Affix the index sticker provided with the turret insert engaged into the optical axis at the index position ④ for IX use on the rear side of the U-UCDB. (Fig. 35)

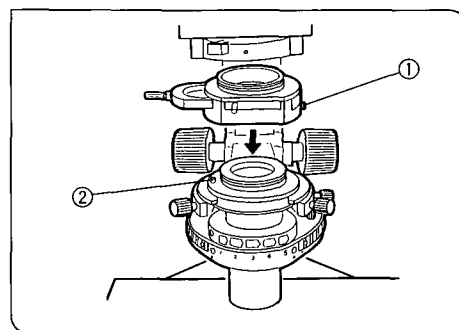


Fig. 36

## 7 Mounting the Polarizer (IX-LWPO) (Fig. 36)

### Universal Condenser (IX-LWUCD)

- ⊙ The polarizer is used in conjunction with the universal condenser for performing differential interference contrast observation.
  1. Using the Allen screwdriver, loosen the polarizer clamping screw ①.
  2. Aligning the pin hole on the polarizer with the positioning pin ② on the condenser, place the polarizer on the condenser.
  3. Tighten the polarizer clamping screw.

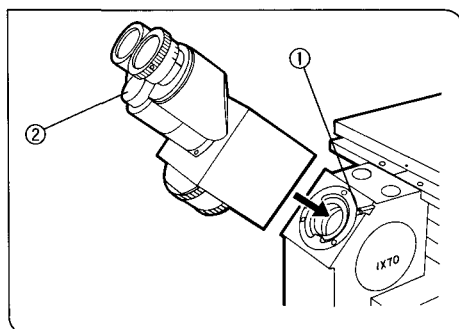


Fig. 37

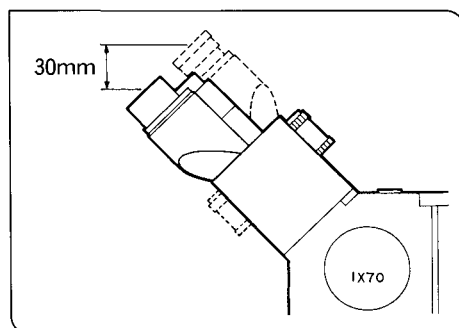


Fig. 38

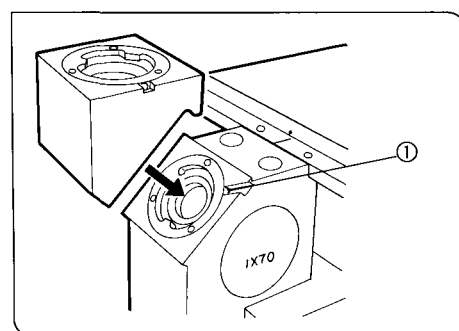


Fig. 39

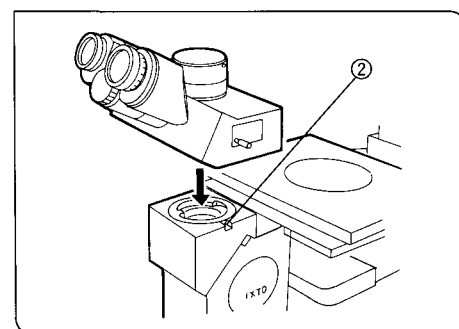


Fig. 40

## 8 Mounting the Observation Tube

(Figs. 37-40)

### Binocular Tube (U-BI90CT, U-BI90)

(Figs. 37, 38)

1. Using the Allen screwdriver, loosen the observation tube clamping screw ① on the observation tube mount. (Fig. 37)
2. Insert the circular dovetail mount of the observation tube into the observation tube mount, placing the observation tube so that the inter-pupillary distance scale numbers ② are seen right side up. Clamp the observation tube by tightening the clamping screw ①.

Ⓞ Normally, the distance from the surface of the desk to the eyepoint is approximately 430 mm. If it is desirable to lower the eyepoint position, the observation tube may be detached, turned 180° and then mounted on the observation tube mount again. Eyepoint height will be lowered approximately 30 mm by this procedure. (Fig. 38)

### Trinocular Tube (U-TR30H)

(Figs. 39, 40)

Ⓞ First mount the intermediate tube (IX-ATU).

1. Using the Allen screwdriver, loosen the observation tube clamping screw ① on the observation tube mount. (Fig. 39)
2. Insert the circular dovetail mount of the intermediate tube into the observation tube mount, placing the intermediate tube so that its upper surface is flush with the microscope frame. Clamp the intermediate tube by tightening the clamping screw ①.
3. Using the Allen screwdriver, loosen the observation tube clamping screw ② on the intermediate tube's observation tube mount. (Fig. 40)
4. Insert the circular dovetail mount of the observation tube into the opening on the intermediate tube, placing the observation tube to point the binocular eyepieces towards the front. Clamp the observation tube by tightening the observation tube clamping screw ②.

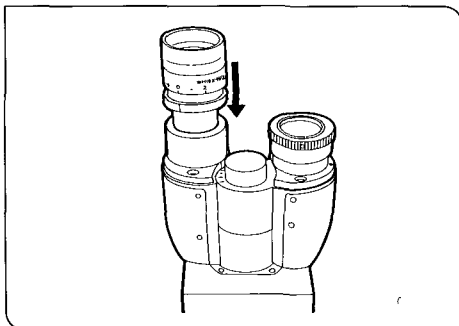


Fig. 41

## 9 Mounting the Eyepieces

(Fig. 41)

1. Remove the eyepiece dust caps.
2. Insert the helicoid equipped eyepiece (WH10X-H) into the eyepiece sleeve with no helicoid (shown on the left in the figure).
3. Insert the eyepiece with no helicoid (WH10X) into the eyepiece sleeve with a helicoid (shown on the right in the figure).

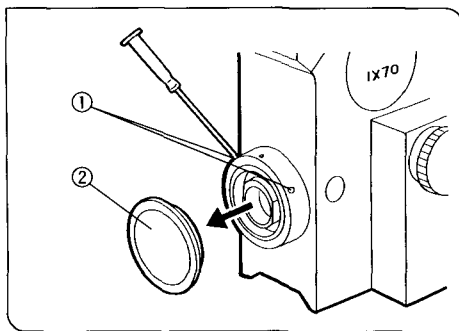


Fig. 42

## 10 Mounting 35 mm Single-lens Reflex Camera (Figs. 42- 44)

### Microscope Frame (IX70)

1. Using the Allen screwdriver, loosen the two OM camera adapter clamping screws ① on the SLR port. (Fig. 42)
2. Use a sharp object such as the tip of a superfine screwdriver or a mechanical pencil to remove the plastic cap ② from the SLR port.

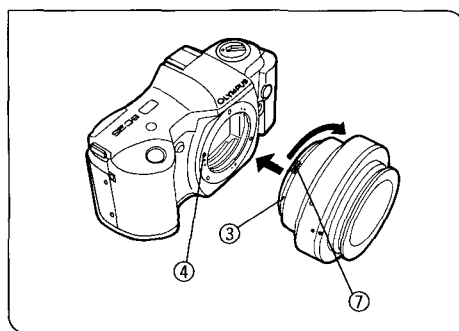


Fig. 43

3. Aligning the red dot ④ on the SC35 camera and the red dot ③ on the OM mount of the OM camera adapter, insert the OM mount into the camera and turn it clockwise until a click is heard. (Fig. 43)
4. Aligning the red dot ⑤ on the OM camera adapter's V-groove side with the red dot ⑥ of the microscope frame's SLR port, insert the OM camera adapter into the port. (Fig. 44)
5. Using the Allen screwdriver, tighten the OM camera adapter clamping screws ①. (Fig. 44)

⊙ When it is required to mount a single-lens reflex camera other than one with an OM mount, please take your camera mount to a camera shop and purchase an adapter (T-ring) that will convert your camera mount to a T-mount. The camera can now be mounted on the microscope frame.

⊙ In addition to single-lens reflex cameras, video cameras having a C-mount or F-mount can also be mounted. (See page 49.)

⊙ To detach the mount from the single-lens reflex camera, rotate the camera counterclockwise while pressing down the button ⑦ on the mount. (Fig. 43)

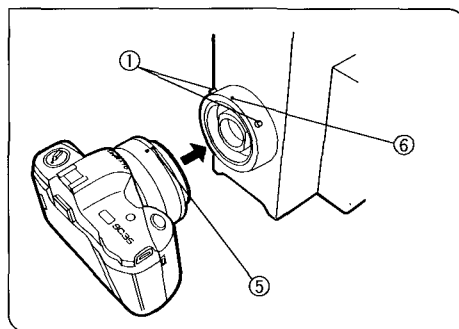


Fig. 44

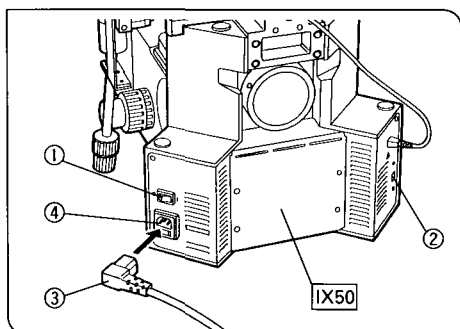


Fig. 45

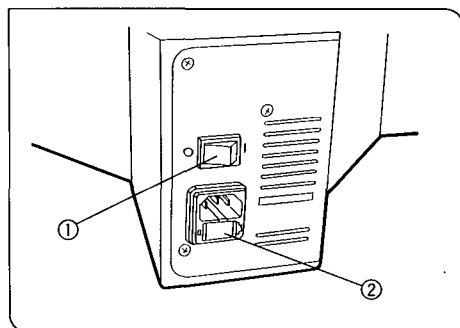


Fig. 46

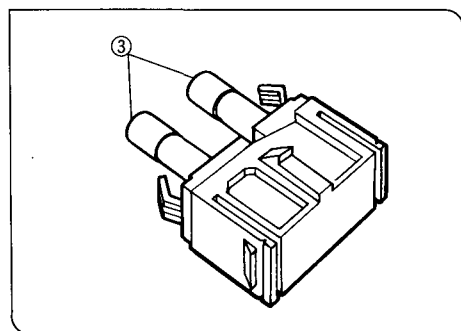


Fig. 47

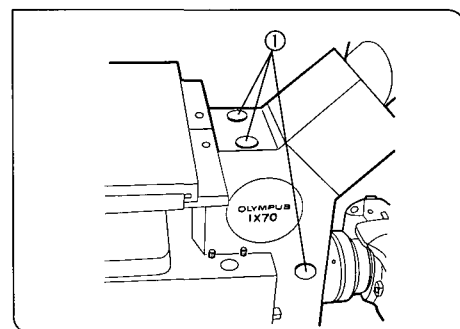


Fig. 48

## 11 Connecting the Power Cord

(Fig. 45)

- ⚠ Cords are vulnerable when bent or twisted. Never subject them to excessive force.
- ⚠ Make sure that the main switch ① is on "O" (OFF) before connecting cords and cables. (Fig. 45)
- ⚠ Always use the power cord provided by Olympus. If no power cord is provided, please select the proper power cord by referring to the section "PROPER SELECTION OF THE POWER SUPPLY CORD" at the end of this instruction manual.

1. Before shipment from factory, the voltage selector switch ② is set to the 200-240V position in case of the IX-50. In case your local line voltage is 100-120V, move the switch to the 100-120V position using a flat-blade screwdriver.
2. Connect the power cord plug ③ to the AC receptacle ④. (Fig. 45)
3. Plug the power cord plug into a wall outlet.

- ⚠ Connect the power cord correctly and ensure that the ground terminal of the power supply and that of the wall outlet are properly connected. If the equipment is not grounded, Olympus can no longer warrant the electrical safety and performance of the equipment.

## 12 Fuse Replacement

(Figs. 46, 47)

- ⊙ Before replacing fuses, set the main switch ① to "O" (OFF) and unplug the power cord. (The power cord should be unplugged from the AC receptacle to allow removal of the fuse cassette.)

1. Remove the fuse cassette ② by inserting the tip of a flat-bladed screwdriver to squeeze in the claw the left or right side of the fuse cassette and pulling outward. (Fig. 47)
2. Replace both fuses ③ with new ones. (Fig. 47)

- ⚠ Use only specified fuses. Use of improper fuse could result in a fire.

Applicable fuse (2 fuses)	
IX70	⇔ T5A(H) 250V (LITTLEFUSE 215005)
IX50	⇔ T3.15A 250V (LITTLE FUSE 2153.15)

## 13 Mounting Accessories Such As Micromanipulator

(Fig. 48)

- ⊙ Eight tapped holes ① are provided on the microscope frame for mounting accessories, such as a micromanipulator, etc. These holes are covered with plastic dust caps. To remove the caps, insert the tip of a flat-blade screwdriver sideways into the space between the cap and the frame.

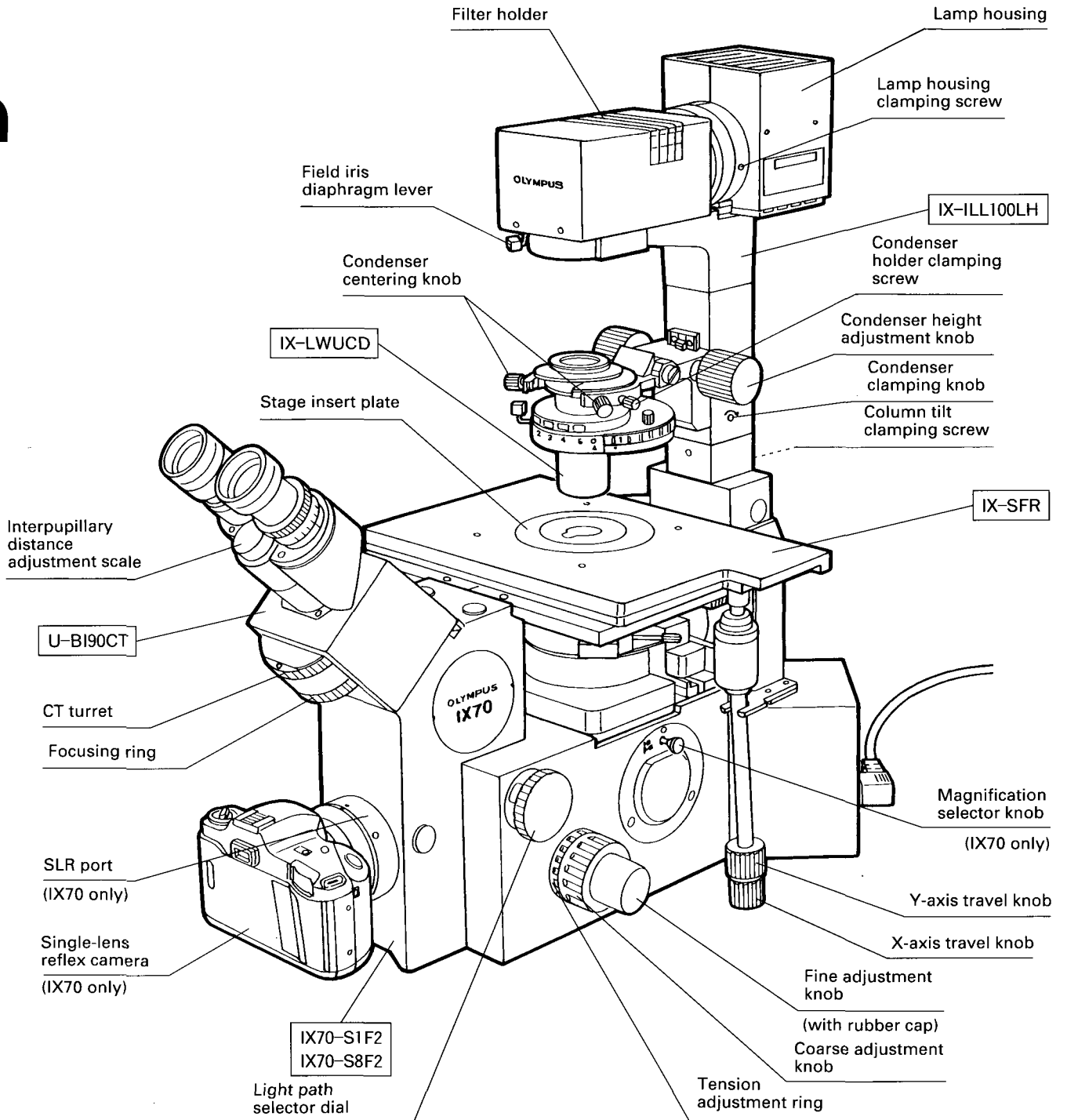
- ★ The applicable screw is M6. The screws can be inserted into the microscope frame up to a depth of 10 mm. Select the screw length in accordance with this.

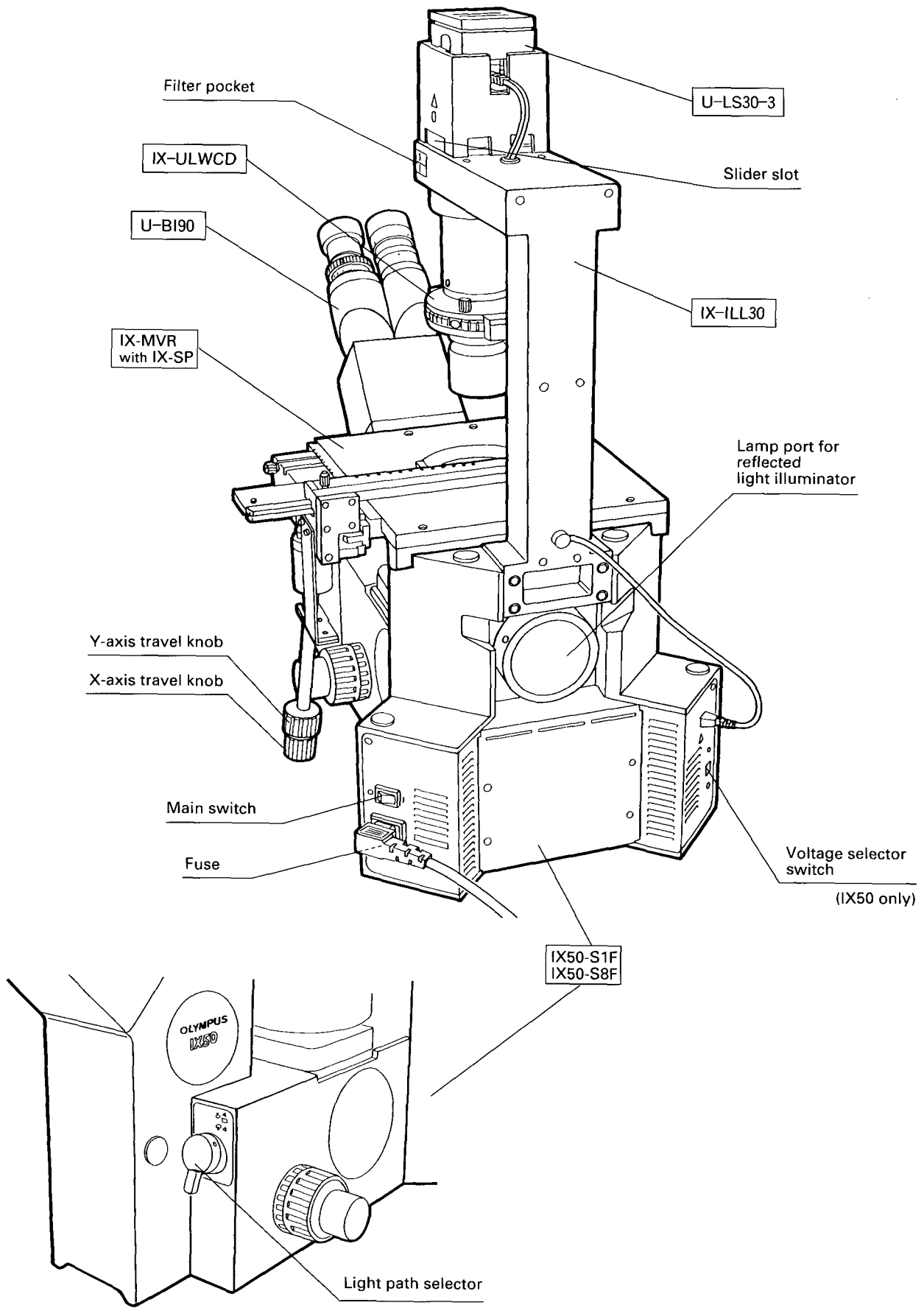
# 3 CONTROLS

© To explain the various controls, three representative combinations are explained on the following pages.

3

CONTROLS

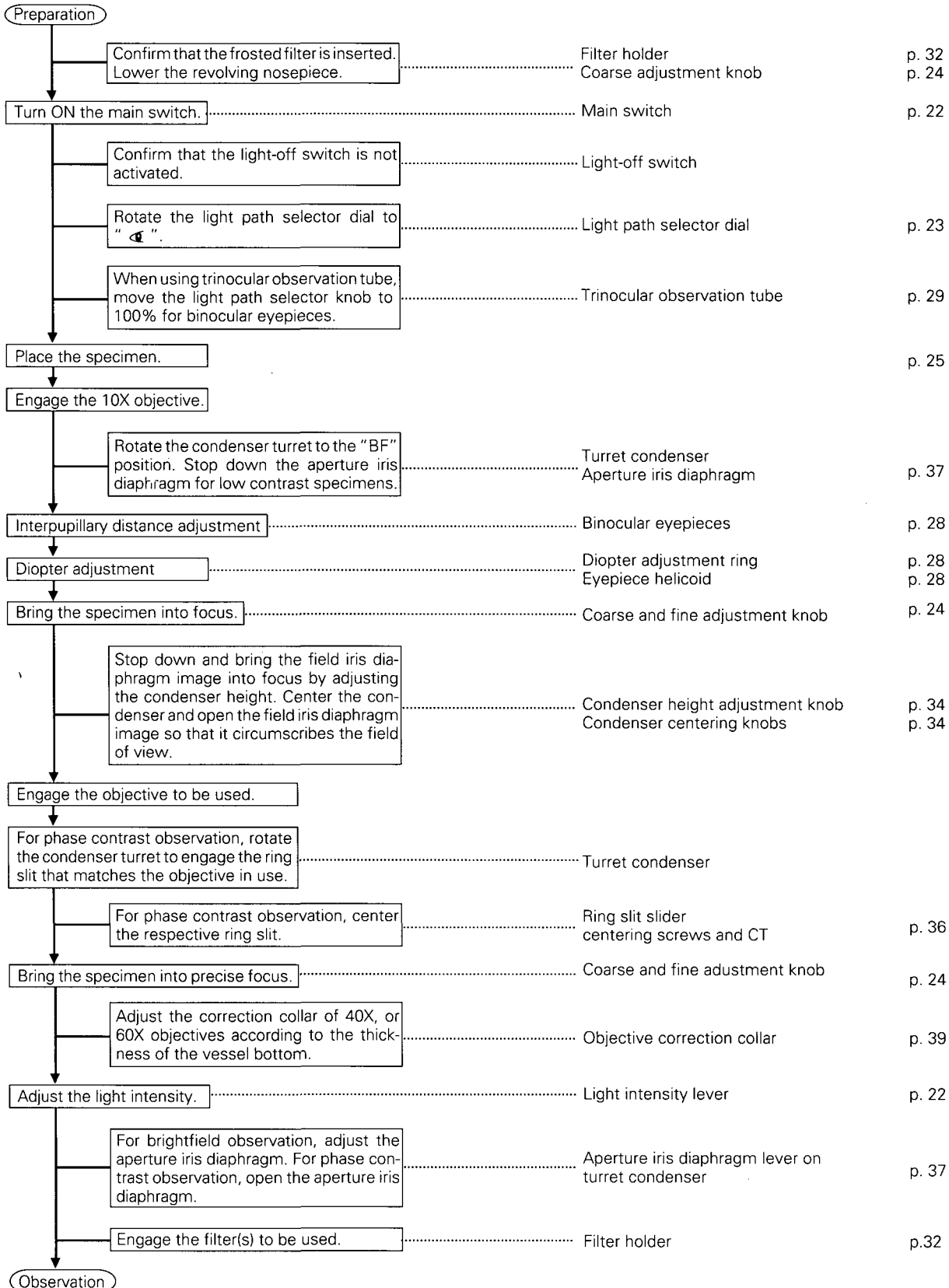




# 4 SUMMARY OF OBSERVATION PROCEDURES

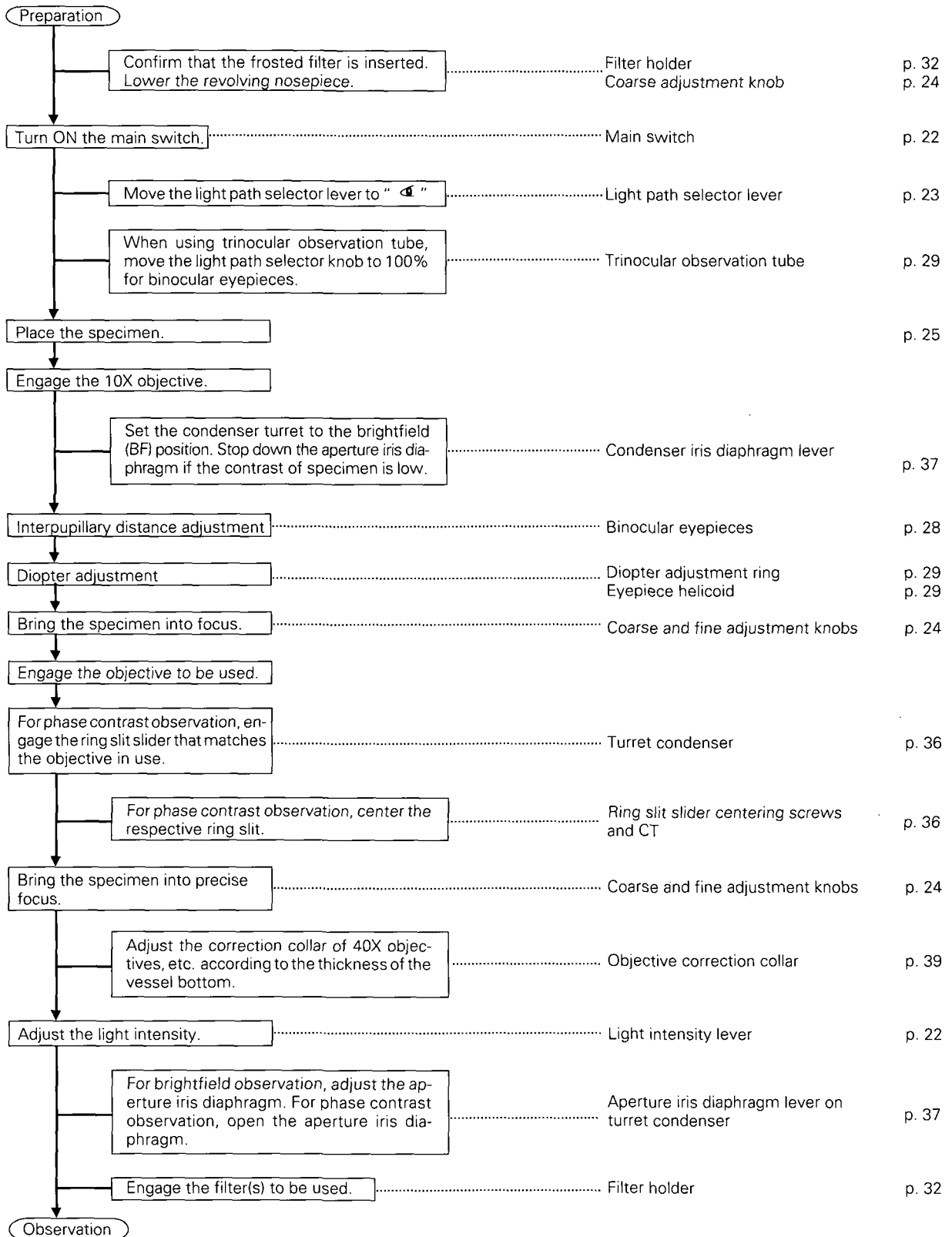
## 4-1 Brightfield/Phase Contrast Observation

(Microscope Frame IX70, Illumination Column 100W Configuration)



## 4-2 Brightfield/Phase Contrast Observation

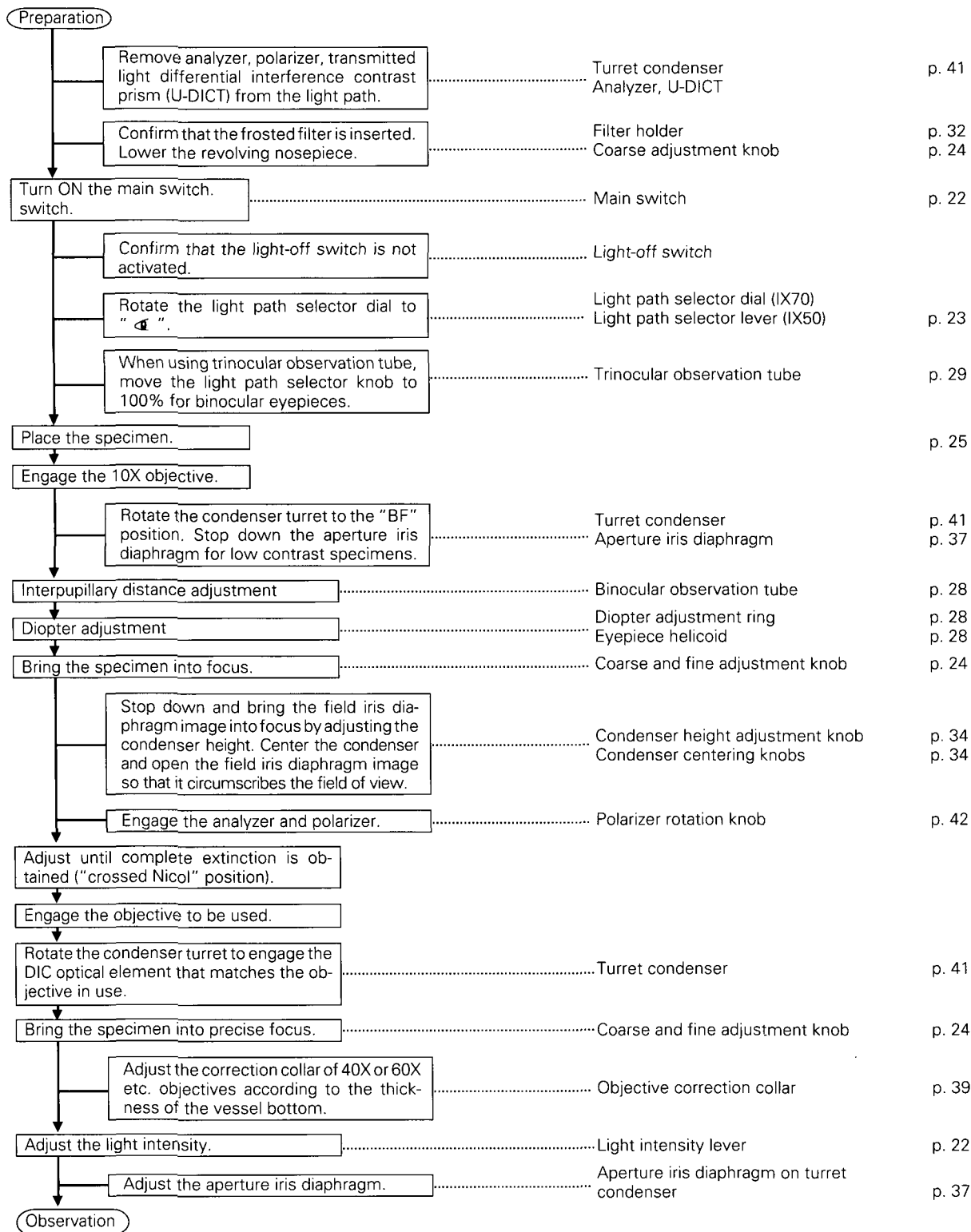
(Microscope Frame IX50, Illumination Column 30W Configuration)





## 4-3 Transmitted Light Nomarski DIC Observation

(When Using the Universal Condenser IX-LWUCD)



© To adjust the background color contrast, rotate the transmitted light differential interference contrast prism control knob.

# 5 USING THE CONTROLS

## 5-1 Base

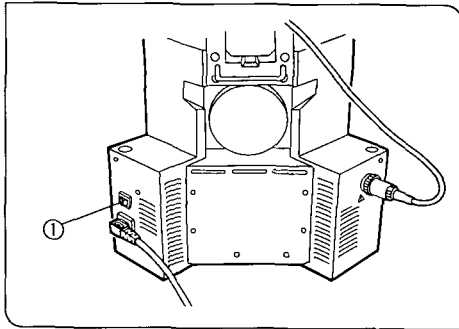


Fig. 49

### 1 Turning ON the Light Source (Fig. 49)

Press the main switch ① at the rear of the microscope frame to ON. (ON is when the switch is set to "I"; OFF is when the switch is set to "O".)

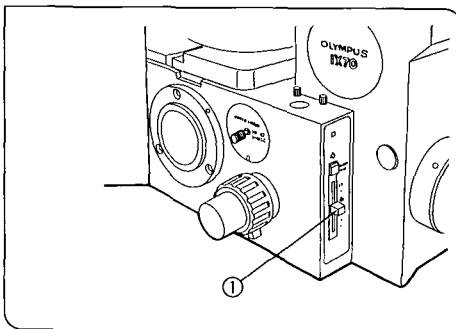


Fig. 50

### 2 Voltage Adjustment (Figs. 50, 51)

Sliding the light intensity lever ① upward increases the voltage, increasing the light intensity.

- ⊙ Move the light intensity lever to find the optimal brightness. Noting the position of the light intensity lever relative to the dots ● to the right of the light intensity lever facilitates duplication of the previous light intensity setting.
- ⊙ For accurate color temperature adjustment, use the color temperature meter of the camera unit.

#### Microscope Frame (IX70)

- ⊙ For color photomicrography, the voltage should be approximately at the level indicated by the camera symbol (☒). The voltage will be approximately 9V.

#### 《 Light-off Switch 》

- ⊙ When observing very weak fluorescent specimens using a high-sensitive video camera, such as a C-CCD or SIT camera, the specimen position is determined using transmitted light. Then, the light-off switch is used to temporarily turn off the transmitted light during video camera observation of the specimen.

1. When the light-off switch ① is depressed, the LED indicator will light up and the transmitted light illumination will be turned off.
2. When the switch is pressed again, the switch lock is released, the LED indicator goes out, and the transmitted light illumination will return to its original brightness.

★ Please note that if the light-off switch is left in the locked position, the illumination will not turn on, even if the main switch is set to "I" (ON).

#### Microscope Frame (IX50)

- ⊙ Is not provided with a camera symbol and light-off switch.

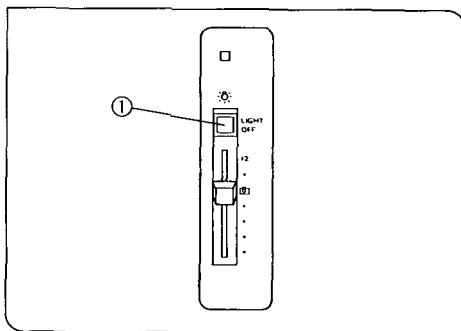


Fig. 51

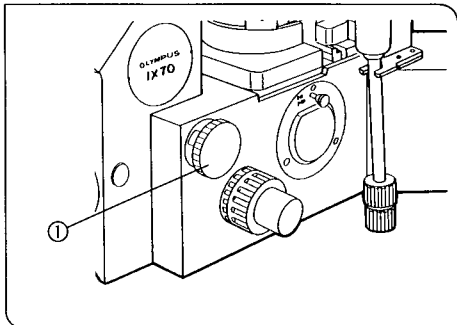


Fig. 52

**3 Light Path Selection**

(Figs. 52, 53)

**Microscope Frame (IX70)** (Fig. 51)

Select the light path by rotating the light path selector dial (1) to the position indicating the desired observation method.

Dial position symbol			
Light path			SP ( SP )
Side port	—	—	80% (100%)
Binocular eyepieces	20%	100%	20% ( — )
SLR port	80%	—	—

Brackets ( ) indicate microscope frame IX70-S1F2.

- ⊙ A vibration damping mechanism is employed to ensure that vibration is reduced to an absolute minimum during light path change provided the light path selection dial is rotated slowly.
- ⊙ The side port can be used for mounting photometric equipment, a camera unit via a straight photo tube, or a video-camera via a video-adaptor.

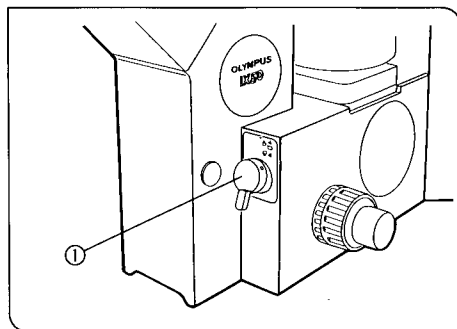


Fig. 53

**Microscope Frame (IX50)** (Fig. 53)

Turn the light path selector lever (1) to the position indicating the desired observation method.

Lever position symbol		
Light path		SP
Side port	—	80% (100%)
Binocular eyepieces	100%	20% ( — )

Brackets ( ) indicate microscope frame IX50-S1F.

- ⊙ The side port can be used for mounting photometric equipment, a camera unit via a straight photo tube, or a video camera via a video adaptor.

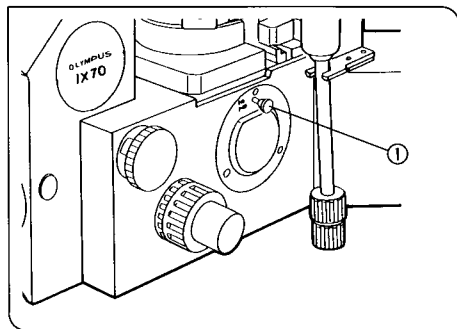


Fig. 54

**4 Magnification Change**

(Fig. 54)

**Microscope Frame (IX70)**

When the magnification selector knob (1) is pulled out, the magnification will be 1.5X. When the knob is pushed in, the magnification will be 1X.  
 ★ When using the IX-CA2X, and depending on the ambient temperature, focus may be lost when the magnification is changed. In this case, readjust the focus. When observing with the IX-CA2X, slight vignetting may occur at the periphery of the field of view. Vignetting will disappear if used in combination with the IX-EPA.

**Microscope Frame (IX50)**

Not equipped with magnification changer.

## 5-2 Focusing Adjustment Knobs

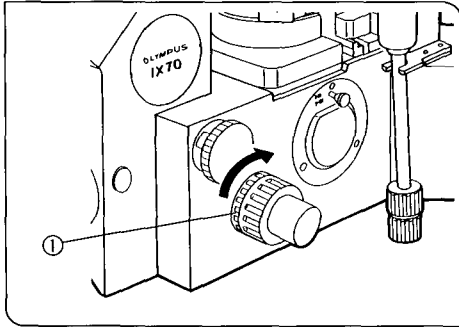


Fig. 55

### 1 Adjusting the Coarse Adjustment Knob Tension (Fig. 55)

- ⊙ Always adjust the coarse adjustment knob tension using the tension adjustment ring ①.

The coarse adjustment knob tension is preadjusted for easy use. However, if desired, one can change the tension using the tension adjustment ring. Turning the ring in the direction of the arrow increases tension, and vice versa.

The tension is too low if the revolving nosepiece drops by itself or focus is quickly lost after adjustment with the fine adjustment knob. In this case, turn the ring in the direction of the arrow to increase tension.

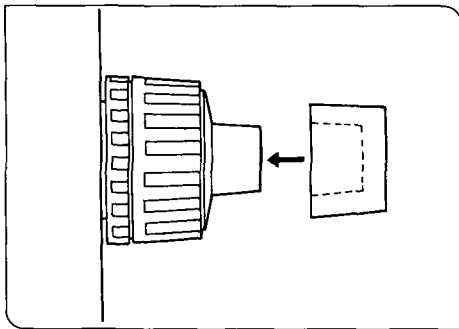


Fig. 56

### 2 Using the Fine Adjustment Knob Rubber Cap (Fig. 56)

- ⊙ Ordinarily, the fine adjustment knob is used with the rubber cap attached. However, if you feel the space between the knob and the stage controls is insufficient, the cap may be removed by pulling it straight out.

The cap makes it easier to turn the fine adjustment knob in small increments to obtain more precise focusing.

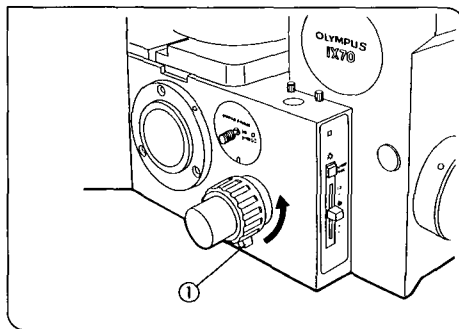


Fig. 57

### 3 Pre-focusing Lever

(Fig. 57)

- ⊙ The pre-focusing lever ensures that the objective does not come in contact with the specimen and simplifies focusing. After focusing on the specimen with the coarse adjustment knob, turn this lever ① in the direction of the arrow to set an upper limit on the objective movement. After changing specimens, refocusing is easily accomplished by turning the coarse adjustment knob to reach the pre-focused position, then making fine adjustments with the fine adjustment knob.
- ⊙ Objective movement with the fine adjustment knob is not affected by this pre-focusing lever.

## 5-3 Stage

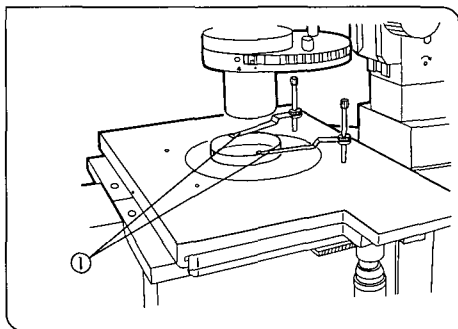


Fig. 58

### 1 Specimen Placement

(Figs. 52-62)

#### Stage (IX-SFR, IX-SVL)

(Fig. 58)

Place the specimen in the center of the stage.

- ⊙ In the case of a slide glass specimen, place the specimen with the cover glass facing down.
- ⊙ If the specimen is prone to slide on the stage, attach the stage clips (U-SCL) ① and clamp the specimen down with the clips.

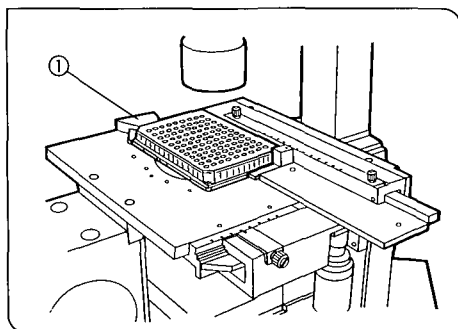


Fig. 59

#### Mechanical Stage (IX-MVR)

(Figs. 59-62)

- ⊙ 96-well and 24-well microtiter plates, etc. are held in place by the specimen holder. Microtiter plates with dimensions of max. 136 mm x 92 mm can be accommodated in this way.
1. Open the spring-loaded finger of the specimen holder ① and slide the microtiter plate into the holder frame. Gently release the curved finger to clamp. (Fig. 59)

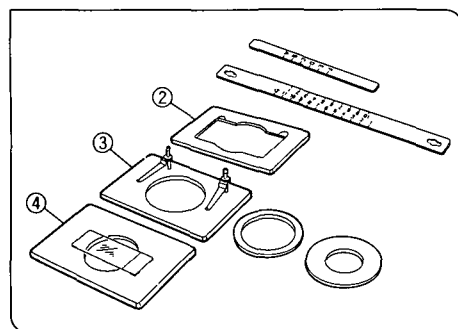


Fig. 60

- ⊙ To secure other vessels than microtiter plates, various optional holders are available. A Terasaki plate holder ② is available for holding Terasaki plates (72-well, 60-well). When using this, it is necessary to replace the stage scales with those provided with the plate holder. Petri dish holder ③ is available for 35 mm, 54 mm, and 60 mm diameter Petri dishes, and a slide glass holder ④ is available for holding slide glass. (Fig. 60)

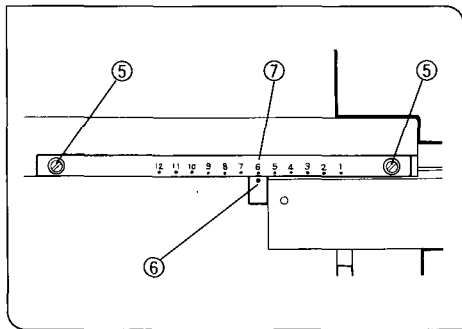


Fig. 61

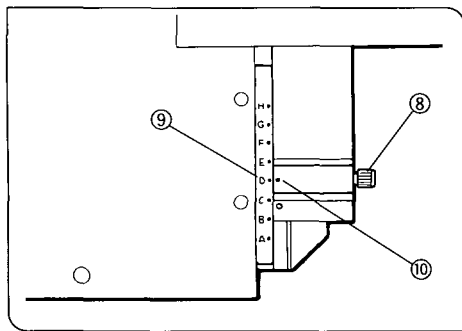


Fig. 62

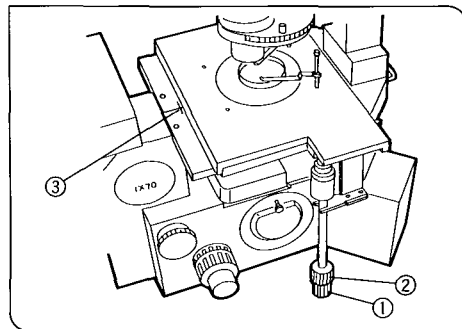


Fig. 63

### « Adjusting the Scales »

⊙ Before using the mechanical stage, adjust the provided scales. The scales are designed to match the X,Y coordinates of a 96-well microtiter plate, thus making it easy to read the coordinates of a well under observation.

1. Operate the Y-axis and X-axis travel knobs to bring a well at the center area of the 96-well microtiter plate (example: D, 6) into the center of the light path.
2. Loosen the X-axis scale clamping knobs ⑤ and slide the scale to align the X-index ● ⑥ with the scale index ● ⑦. Then tighten the X-axis scale clamping knobs. (Fig. 61)
3. Loosen the Y-axis index clamping knob ⑧ and move the scale to align the scale index ● ⑨ with the index ● ⑩. Then tighten the Y-axis index clamping knob. (Fig. 62)

## 2 Moving the Specimen

(Fig. 63)

### Stage (IX-SFR, IX-SVL)

1. To move the specimen to a desired position, rotate the X-axis knob ① and the Y-axis knob ②.
- ⊙ When the index mark of the upper stage is aligned with the index line ③ provided on the substage, the center of the stage insert plate aperture is almost in the center of the optical axis. Use this as a guideline when moving the specimen. Travel area is 50 mm x 50 mm.
- ⊙ If the revolving nosepiece is rotated to change the objective immediately after observing the specimen with an objective having a short working distance (0.5mm or less), the objective may impinge on the stage insert plate. If objectives with a short W.D., or oil immersion objectives, are frequently employed, using the optional stage insert plate with 50 mm diameter aperture (IX-CP50) will greatly reduce the risk of the objective(s) hitting the stage insert plate.
- ★ The stage (IX-SVL) travel area is 43 mm (Y) x 50 mm (X).

### Attachable Mechanical Stage (IX-MVR)

Specimens are moved in the same manner as outlined in Step 1 above.

- ⊙ The stage travel area is 85 mm (Y) x 130 mm (X).

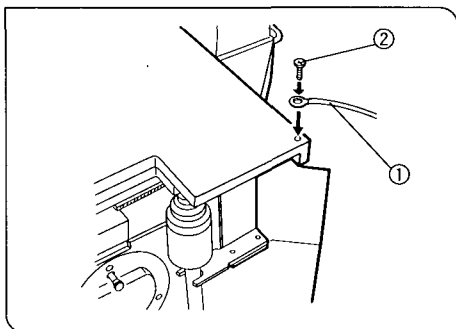


Fig. 64

### 3 Connecting the Grounding Wire

(Fig. 64)

Stage (IX-SFR, IX-SVL)

- ⊙ A grounding wire can be attached to the stage for electrophysiological experiments, etc.

Prepare a grounding wire ① and one M4 screw ②, and attach the wire as shown in Fig. 64.

★ The screw hole may be covered by a paint covering, etc. Therefore, before fastening the grounding wire, screw in and unscrew the M4 screw several times until the screw hole's metal portion is exposed. Then tighten the screw to put the grounding wire in firm contact with the stage.

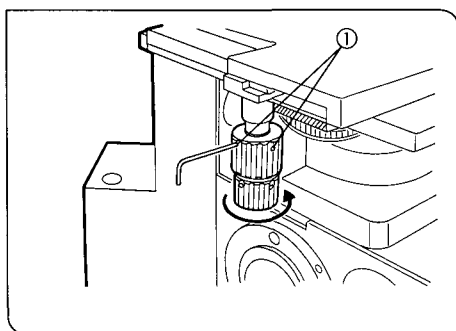


Fig. 65

### 4 Adjusting the Tension of X-axis and Y-axis knobs

(Fig. 65)

Stage (IX-SVL)

- ⊙ The tension of the X-axis and Y-axis knobs can be individually adjusted.

1. Using the provided Allen wrench, loosen the two set screws ①. While holding the stage stationary, turning the knob in the direction of the arrow increases tension, and turning it in the opposite direction reduces tension.

2. After adjusting the tension, tighten the two set screws again.

★ If the tension is adjusted too tight, or too loose, the image may jump or show backlash during stage travel.

5

USING THE CONTROLS

## 5-4 Observation Tube

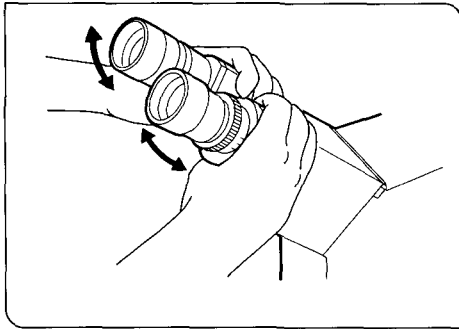


Fig. 66

### 1 Interpupillary Distance Adjustment (Fig. 66)

While looking through the eyepieces, adjust the binocular vision until the left and right fields of view coincide completely. The index dot ● indicates the interpupillary distance.

⊙ Note your interpupillary distance so that it can be quickly duplicated.

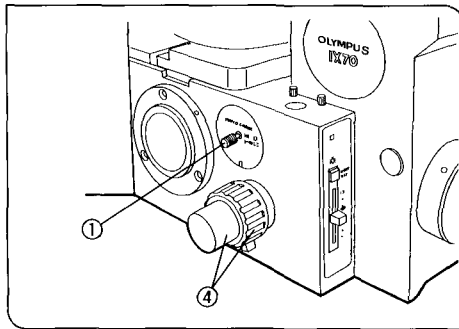


Fig. 67

### 2 Diopter Adjustment (Figs. 67-71)

Microscope Frame (IX-70)

(Figs. 67-69)

1. Pull out the photo frame ① to engage the photo mask into the light path. (Fig. 67)
2. Looking through the right-hand light path's helicoid eyepiece, turn the diopter adjustment ring ② on the eyepiece sleeve until the reticles in the center of the photo mask are seen as two distinct sets of reticles in the field of view. (Figs. 68, 69)
3. Looking through the left-hand light path's eyepiece, turn the diopter adjustment ring ③ on the eyepiece until the reticles in the center of the photo mask are seen as two distinct sets of reticles in the field of view.
  - ★ When turning the eyepiece's diopter adjustment ring, use your other hand to hold the lower part of the eyepiece stationary.
4. Rotate the coarse and fine adjustment knobs ④ to bring the specimen into focus. (Fig. 67)

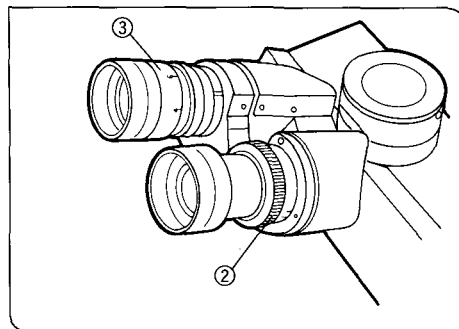


Fig. 68

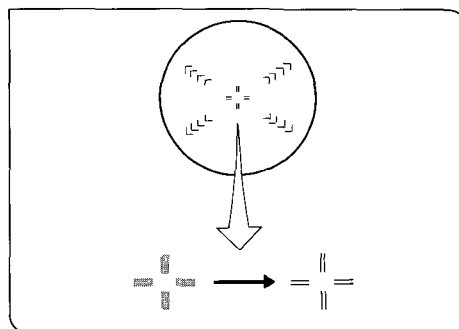


Fig. 69

5

USING THE CONTROLS



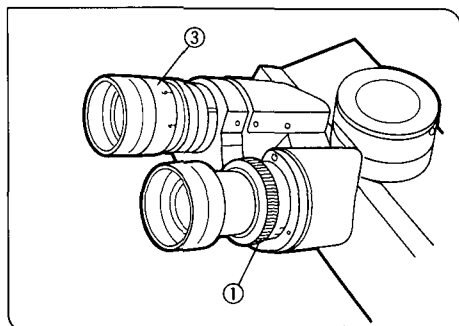


Fig. 70

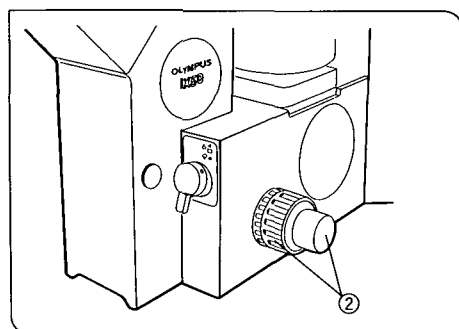


Fig. 71

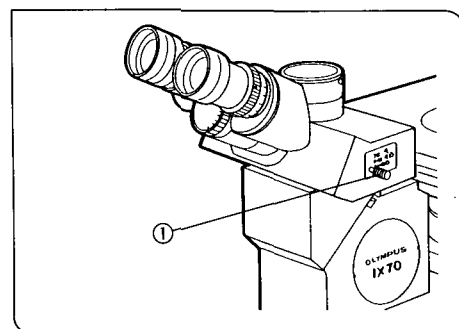


Fig. 72

### Microscope Frame (IX-50)

(Figs. 70, 71)

1. Looking through the right eyepiece, turn the diopter adjustment ring ① on the eyepiece sleeve until the periphery of the field of view is sharp. (Fig. 70)
  - ⊙ Diopter adjustment can also be performed when eyepiece micrometers are used.
2. Looking through the eyepiece, rotate the coarse and fine adjustment knobs ② to bring the specimen into focus. (Fig. 71)
3. Looking through the helicoid eyepiece, turn the diopter adjustment ring ③ on the eyepiece to focus on the specimen. (Fig. 70)
  - ★ When turning the eyepiece's diopter adjustment ring, use your other hand to hold the lower part of the eyepiece stationary.




### 3 Observation Tube Light Path Selection

(Fig. 72)

#### Trinocular Observation Tube (U-TR30H)

Slide the light path selector knob ① to select the desired light path.

- ⊙ The selector knob is ordinarily at the middle position. With dark specimens, push the knob in. If additional light is needed for television or photomicrography, pull the knob out.

Light path selector knob	Symbol	Intensity ratio	Application
Pushed in		100% for binocular eyepieces	Observation of dark specimens
Middle position		20% for binocular eyepieces, 80% for TV/photography	Observation of bright specimens, photography, TV observation
Pulled out		100% for TV/photography	Photography, TV observation

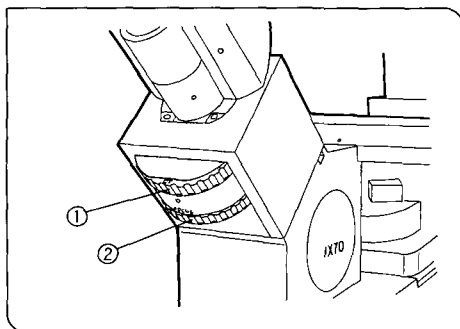


Fig. 73

**4** How to Use the CT (Bertrand Lens) Turret (Fig. 73)

**Binocular Tube (U-BI90CT)**

- To use the CT turret ①, turn the knurled ring with a finger to select the setting corresponding to the indication (O-CT-O-S). When selecting the setting, make sure the turret is correctly positioned at a click-stop. (Set the magnification selector knob on the IX70 microscope frame to 1X.)

Turret symbol	Application
O (2 positions)	Nothing is engaged into the light path (normal observation)
CT	The CT lens is engaged into the light path and the objective exit pupil can be observed. Used when centering the ring slit and phase annulus in phase contrast and adjusting the aperture iris diaphragm.
S	The light excluding plate is engaged into the light path to block extraneous light from entering via the eyepieces. Used during photomicrography to prevent extraneous light from affecting the exposure.

- To bring the exit pupil image of the objective into focus when using the CT lens, turn the focusing ring ② to adjust.

**Binocular Tube (U-BI90), Trinocular Tube (U-TR30H)**

These observation tubes are not equipped with a built-in CT lens. Use a focusing telescope (U-CT30).

- Engage the 10X objective and obtain approximate focus. Replace the objective with the focusing telescope.
- Rotate the knurled portion of the focusing telescope and bring the objective exit pupil into focus.

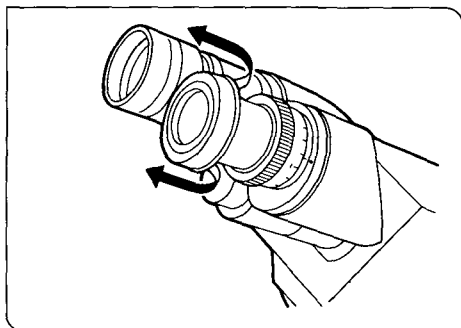


Fig. 74

**5** Using the Eye Shades (Fig. 74)

**When Wearing Eyeglasses**

Use with the eye shades in their normal folded down position. This will prevent the eyeglasses from being scratched.

**When Not Wearing Eyeglasses**

Extend the folded eye shades in the direction of the arrow for efficient use of the eye shades.

## 5-5 Illumination Column

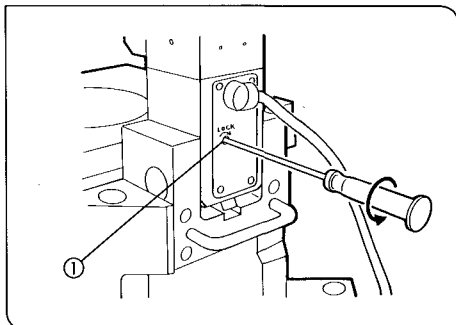


Fig. 75

### 1 Tilting the Illumination Column

(Fig. 75)

#### Illumination Column (IX-ILL100LH)

- ⊙ When replacing large specimens, placing a micromanipulator, or replacing a patch clamp electrode, working space can be created by tilting the illumination column.
  - ⊙ Even with the illumination column tilted, the specimen surface will be illuminated, which is convenient for rough confirmation of the specimen location or initial positioning when placing the specimen.
1. Using the Allen screwdriver, loosen the column tilt clamping screw ① by rotating it approximately 11 rounds in the direction of the arrow.
  2. Holding the illuminator attachment's upper front side, slowly tilt the illumination column backward. Vibrations should be avoided. Accordingly, always support the illumination column with a hand and tilt slowly and gently. To return the column to its original position, reverse this procedure.
    - ★ If the reflected light illuminator attachment is mounted, and the condenser holder is left rotated to the back of the column, the condenser holder will contact the reflected light illuminator attachment lamp housing if the illumination column is tilted. Accordingly, do not attempt to tilt the illumination column while the condenser holder remains situated at the back of the column.
- ⚠ When tilting the illumination column upwards or downwards, make sure not to catch your fingers in the hinge joint.
    - ★ The tilt clamping screw should normally be tightened during use. If the microscope is used while the screw is loosened, make sure that the illumination column does not accidentally tilt during use.
  - ⚠ When moving or transporting the microscope, always do so with the tilt clamping screw tightened.
    - ★ If the lamp housing unit is remodeled, and a heavy module, such as a high-intensity lamp housing, is installed, always use the microscope with the tilt clamping screw tightened.

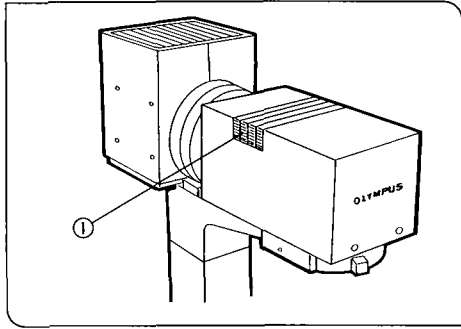


Fig. 76

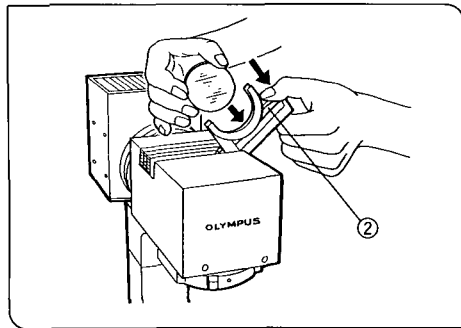


Fig. 77

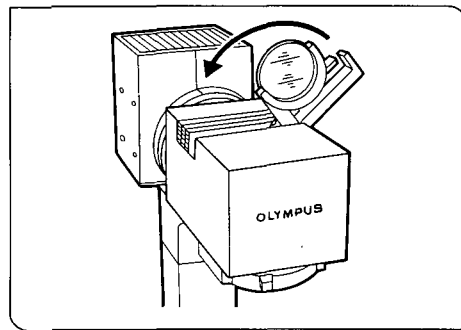


Fig. 78

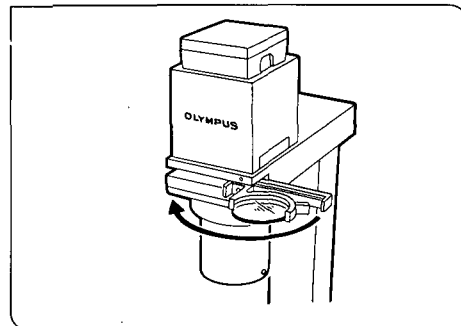


Fig. 79

## 2 Mounting Filters

(Figs. 76-79)

### Illumination Column (IX-ILL100LH)

(Figs. 76-78)

⊙ 45 mm diameter, maximum 6 mm thick filters can be used. Various filters, such as the provided frosted filter, the color temperature conversion filter (LBD), the green interference filter (IF550), and ND filter, can be mounted.

1. Place a finger on the milled section ① of the filter holder and lift the filter holder. (Fig. 76)

2. While pressing down the protrusion of the plastic filter holder ②, insert the filter. (Fig. 77)

★ Hold the filter by its edge to avoid leaving fingerprints or smudges on the filter surface.

⚠ After the illumination has been turned ON, the filter will be very hot. Only replace filters after setting the main switch to "O" (OFF) and allowing the filter holders and filters to cool.

3. Engage the filters into the light path by moving them in the direction indicated by the arrow. (Fig. 78)

★ Unless maximum intensity is required, always leave the frosted filter engaged in the light path.

### Illumination Column (IX-ILL30)

(Fig. 79)

1. For details on how to mount filters, see "Illumination Column (IX-ILL100LH)" above.

2. Engage the filters into the light path by moving them in the direction indicated by the arrow.

★ Unless maximum intensity is required, always leave the frosted filter engaged in the light path.

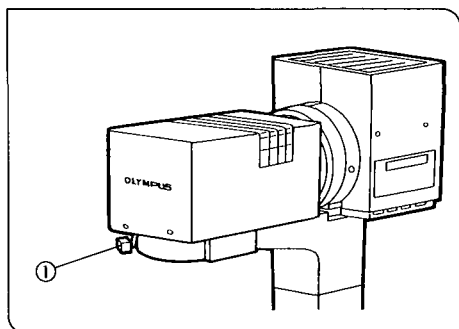


Fig. 80

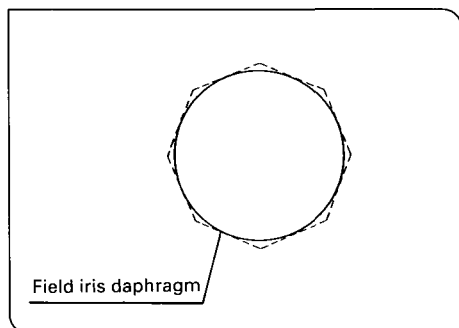


Fig. 81

### 3 Using the Field Iris Diaphragm

(Figs. 80, 81)

#### Illumination Column (IX-ILL100LH)

- ⊙ The field iris diaphragm lever ① is used to adjust the diameter of the illuminating beam in accordance with the objective in use. Adjust the diaphragm so the field of view is circumscribed by the field iris diaphragm to exclude stray light.
  - ⊙ To limit specimen damage or fading when observing living cells or fluorescent specimens, the field iris diaphragm may be stopped down.
- The field iris diaphragm can be opened/closed by moving the field iris diaphragm lever ① rightward/leftward.

#### Illumination Column (IX-ILL30)

Is not provided with a field iris diaphragm. (It has a fixed diaphragm.)

## 5-6 Condenser

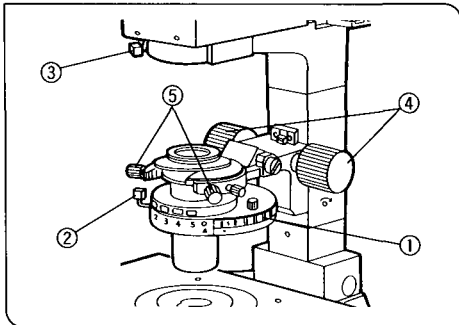


Fig. 82

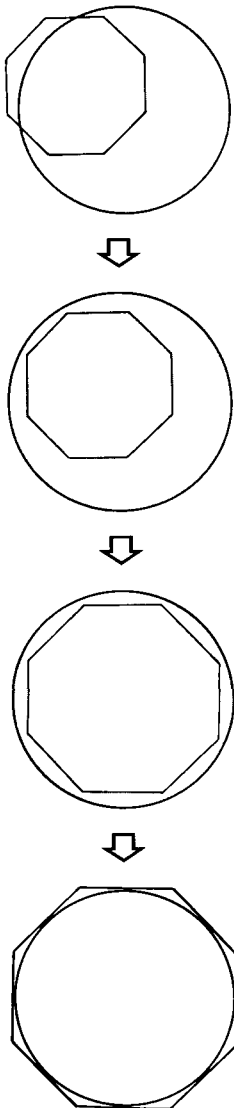
### 1 Centering the Condenser

(Figs. 82, 83)

Universal Condenser (IX-LWUCD), Condenser (IX-ULWCD) (Fig. 82)

« Illumination Column (IX-ILL100LH) »

1. Rotate the turret ① to select the "BF" brightfield observation setting (no optical element engaged).
  2. Turn the aperture iris diaphragm lever ② to open the diaphragm.
  3. Move the field iris diaphragm lever ③ to the fully open position (⊗→○).
  4. Engage the 10X objective and bring the specimen into focus.
  5. Using the field iris diaphragm lever, stop down the field iris diaphragm until its image is just inside the field of view.
  6. Turn the condenser height adjustment knob ④ to bring the field iris diaphragm image into focus.
  7. While gradually opening the field iris diaphragm image, rotate the condenser holder's condenser centering knobs ⑤ to adjust so that the field iris diaphragm image is centered in the eyepiece field of view.
  8. To check centration, open the field iris diaphragm until its image touches the perimeter of the field of view. If the image is not precisely inscribed in the field of view, center the condenser again.
- © When used for actual observation, open the field iris diaphragm until its image just circumscribes the field of view.
- ★ When the condenser (IX-ULWCD) is used in combination with 40X or higher power objective, the field iris diaphragm cannot be seen in the visual field.
  - ★ The field iris diaphragm cannot be seen in the field of view when the condenser (IX-LWUCD) is used in combination with a 100X objective.



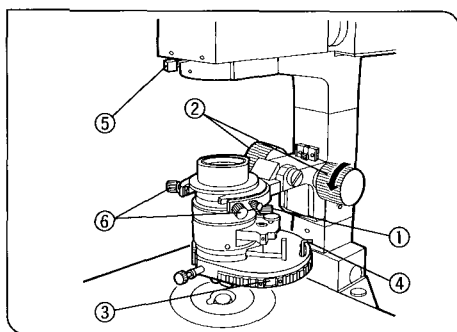


Fig. 83

## Transmitted Light Universal Condenser (U-UCDB)

(Fig. 83)

★ For operation of the U-UCDB, refer to the provided instruction manual (BX-UCDB).

Since this condenser is used in its inverted condition, the turret inserts may fall out if the condenser is subjected to shock or impact. In particular, be careful when tilting the condenser holder.

## 《 Illumination Column (IX-ILL100LH) 》

1. Loosen the condenser height fine adjustment knob ① by turning it counterclockwise. Then push it all the way to the rear.
  2. Rotate the condenser height adjustment knob ② in the direction of the arrow to lower the condenser to its lowest position.
  3. Rotate the turret ③ to select the "BF" brightfield observation setting (no optical element engaged.)
  4. Turn the aperture iris diaphragm lever ④ to open the diaphragm.
  5. Move the field iris diaphragm lever ⑤ to the fully open position. (⊗ → ○).
  6. Engage the 10X objective and bring the specimen into focus.
  7. Using the field iris diaphragm lever, stop down the field iris diaphragm until its image is just inside the field of view.
  8. Slowly move the condenser height fine adjustment knob ① to the front to bring the field iris diaphragm image into focus. When the image is in focus, clamp the knob by turning it clockwise.
  9. While gradually opening the field iris diaphragm image, rotate the condenser holder's condenser centering knobs ⑥ to adjust so that the field iris diaphragm image is centered in the eyepiece field of view.
  10. To check centration, open the field iris diaphragm until its image touches the perimeter of the field of view. If the image is not precisely inscribed in the field of view, center the condenser again.
- ⊗ When used for actual observation, open the field iris diaphragm until its image just circumscribes the field of view.
- ⊙ When replacing the specimen or applying oil, use the condenser height adjustment knob to first raise the condenser and then lower it to its lowest position. If this is done, it should be unnecessary to adjust the condenser centration or focus again.

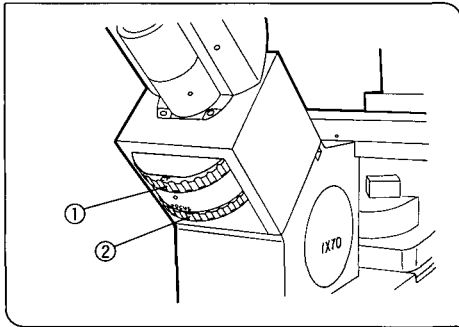


Fig. 84

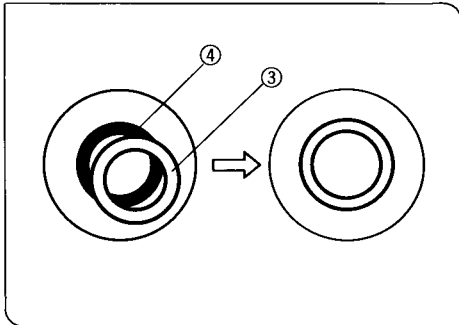


Fig. 85

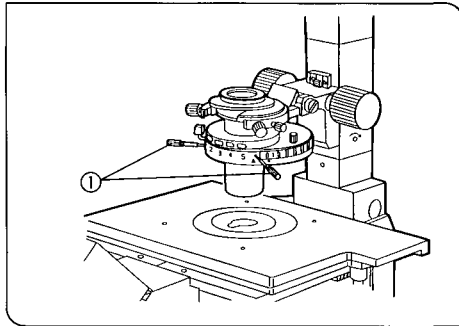


Fig. 86

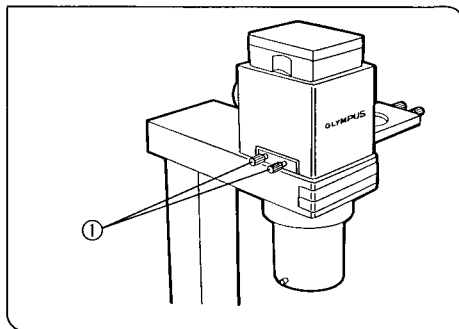


Fig. 87

## 2 Centering the Phase Contrast Ring Slit Attachment

(Figs. 84-87)

1. Engage the phase contrast objective and bring the specimen into focus.
2. When the U-BI90CT binocular observation tube is used, rotate the CT turret ① to select the "CT" position. When observation tubes other than the U-BI90CT are used, remove an eyepiece and replace it with the focusing telescope (U-CT30). (Fig. 84)
3. Engage the ring slit in the condenser that matches the phase contrast objective.
4. Turn the focusing ring ② (the knurled ring in case of the focusing telescope) and focus on the objective phase annulus ④ matching the condenser ring slit ③. (Figs. 84, 85)
5. The centering operations for each unit are outlined below.
  - ★ Ring slit ghost images may appear. In this case, select the brightest ring to superimpose over the phase annulus.
  - ★ In case of thick specimens, or if the specimen is moved or replaced, the concentric superimposition of the ring slit and phase plate may be disturbed. In this case, and if the observed image contrast is poor, perform steps 1 through 4 again to re-adjust.
6. After centering, rotate the CT turret to return the turret to the "0" position. If the focusing telescope (U-CT30) was used, replace it with the eyepiece.

### Universal Condenser (IX-LWUCD), Condenser (IX-ULWCD) (Fig. 86)

Using the optical element centering wrenches ①, rotate the phase condenser ring slit centering screws (marked ▲) until the ring slit image is superimposed over the objective phase annulus.

★ To obtain best contrast, re-centering may be required if the bottom of a culture vessel is not completely flat. Perform centering in the order of low to higher power objectives.

### Condenser (IX-SLWCD) (Fig. 87)

- Rotate the ring slit slider's centering knobs ① to superimpose the ring slit image over the phase annulus of an objective compatible with the ring slit.

Ring slit	Compatible objective
PhL	UPlanF14XPh
PhC	CPlan10XPh, LCAch20XPh, CPlanFI10XPh



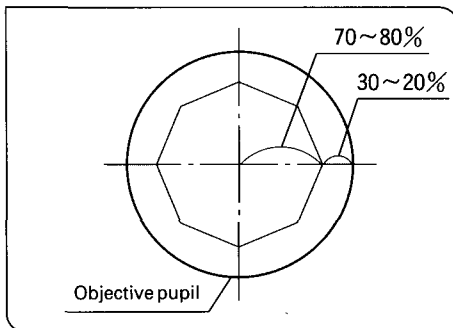


Fig. 88

### 3 Using the Aperture Iris Diaphragm (Fig. 88)

- ⊙ In general, the potential resolving power of an objective is fully utilized if the diaphragm is stopped down to correspond with the numerical aperture (N.A.) of the objective.
- ⊙ Depending on the specimen, image contrast may be improved, or focus depth increased, by keeping the aperture iris diaphragm stopped down a little during observation or photomicrography. In general, a good image is obtained if the diaphragm is stopped down to 70-80% of the numerical aperture of the objective. Stop further down for less contrasty specimens.
- ⊙ To check the position of the aperture iris diaphragm, remove the eyepieces. Looking through the eyepiece sleeves, the aperture iris diaphragm image and the objective's exit pupil can be seen.
- ⊙ When using the binocular observation tube (U-BI90CT), and setting the turret to "CT", or when using a focusing telescope (U-CT30), the aperture iris diaphragm can be observed in the same way.

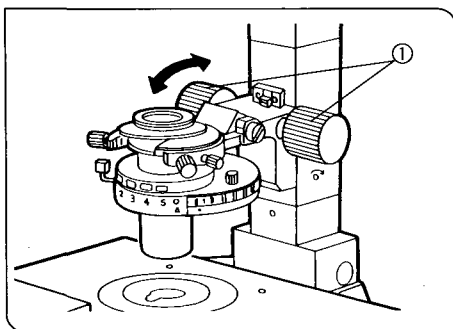


Fig. 89

### 4 Adjusting the Tension of the Condenser Height Adjustment Knobs (Fig. 89)

#### Illumination Column (IX-ILL100LH)

- ⊙ The tension of the condenser height adjustment knobs ① is preadjusted for easy use. However, if desired you can change the tension. Holding the right condenser height adjustment knob stationary with the right hand, rotate the left condenser height adjustment knob until the tension of the knobs is as desired.

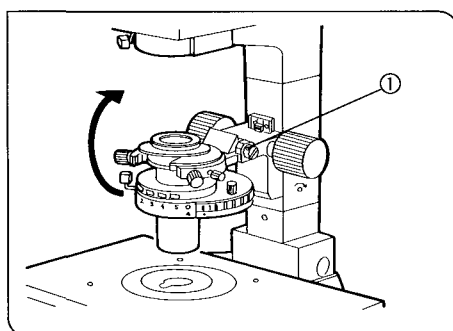


Fig. 90

### 5 Tilting the Condenser Holder (Fig. 90)

#### Illumination Column (IX-ILL100LH)

- ⊙ To create working space and facilitate specimen replacement, micro-manipulator positioning, or mounting an objective through the hole in the stage, tilt the condenser holder upwards.
  1. Placing a hand against the bottom of the condenser holder, press upwards.
  2. The tension of the tilt can be adjusted by rotating the adjustment screw ① using a turret insert centering wrench or the shank of the Allen screwdriver.
    - ★ Adjust the tension so that the tilted condenser will not drop down by itself.
    - ★ When returning a tilted condenser to its original position, do so gently and slowly.

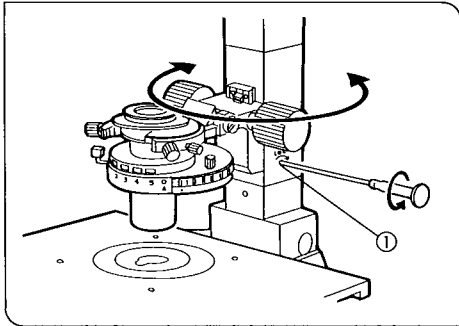


Fig. 91

**6 Rotating the Condenser Holder**

(Fig. 91)

**Illumination Column (IX-ILL100LH)**

- ⊙ When replacing large specimens, placing a micromanipulator, or placing a patch clamp electrode, working space can be created by turning the condenser holder all the way to the rear of the illumination column. It is convenient for the observation of large culture vessels. Using the Allen screwdriver, loosen the clamping screw ①. Rotate the condenser holder.
- ★ When the condenser holder is rotated out of the way, specimens with a height of up to 230 mm can be placed on the stage surface.

## 5-7 Objectives

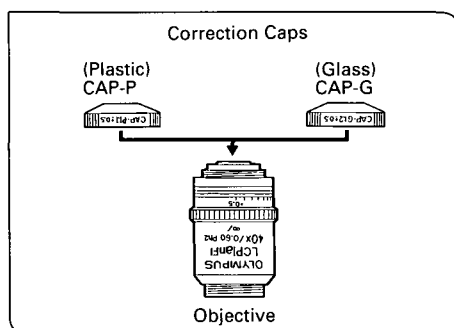


Fig. 92

### 1 Correction Caps for Objectives

(Fig. 92)

The following objectives can be used with correction caps. By attaching the caps in accordance with the bottom thicknesses of various vessels, optimum performance is obtainable with glass vessels, and plastic vessels.

#### 《 Objective Types 》

Brightfield/ Differential interference	Phase contrast/ Brightfield	Correction collar
LCPLFL20X LCPLFL40X LCPLFL60X	LCPLFL20XPh LCPLFL40XPh LCPLFL60XPh	None Available Available
Provided as standard accessory Correction cap: CAP-G1.2	Provided as standard accessory Correction cap: CAP-P1.1	

★ As shown in the above table, the brightfield/differential interference objectives are delivered with the correction cap "CAP-G1.2" for use with glass vessels, and the phase contrast/brightfield objectives are delivered with the "CAP-P1.1" as standard accessory. Confirm the compatibility of the culture vessel in use.

#### 《 Correction Cap Types (usable with all objective types) 》

	Name	Applicable vessel thickness range (mm)
Glass vessels	CAP-G0.5	0 - 1.0
	CAP-G1.2	0.7 - 1.7
	CAP-G2	1.5 - 2.5
Plastic vessels	CAP-P0.5	0 - 1.0
	CAP-P1.1	0.6 - 1.6
	CAP-P2	1.5 - 2.5

### 2 Correction Collar Adjustment

1. The correction collar is effective with 0 to 2.5 mm thick vessel bottom thicknesses. If the thickness of the vessel bottom is known, match the correction collar to the thickness of the vessel bottom by using the scale.
2. How to find the optimum position for optimum image resolution and contrast.
  - ◎ If the thickness of the vessel bottom is unknown, the optimum position for the correction collar can be obtained by judging the image resolution. When a satisfactory image is not obtained after focusing, rotate the correction collar to the right or the left and refocus to compare the image at both sides. Return the collar to the position yielding the improved image; then starting from this position, further rotate the collar slightly to the right or left, refocusing each time, to compare the image at each position. Repeat this procedure until the position with the optimum image is found.

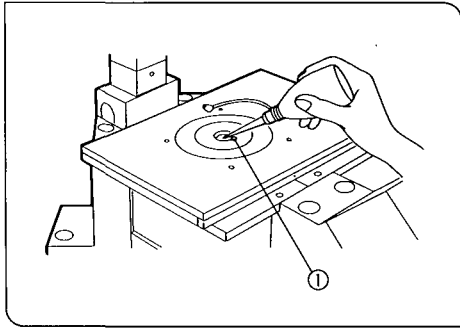


Fig. 93

### 3 Using Immersion Objective

(Fig. 93)

1. Using a low power objective, bring the specimen into focus.
2. Rotate the revolving nosepiece to engage the oil immersion objective.
3. Remove the specimen and move the stage insert cut-out ① close to the objective front lens. Apply a drop of the provided immersion oil to the front lens of the objective. Place the specimen and rotate the fine adjustment knob to bring the specimen into focus.

★ Use as little oil as possible. Immediately after use, remove the oil.

★ If the oil contains air bubbles, the image will be degraded. Make sure the oil is free of air bubbles.

- (1) To check for air bubbles, remove the eyepieces. Completely open the field iris diaphragm and aperture iris diaphragm. When looking at the objective exit pupil (looking like a bright circle), any air bubbles can be seen.
  - (2) To remove air bubbles, slightly rock the revolving nosepiece to engage and disengage the oil immersion objective once or twice.
4. After use, wipe away the immersion oil at the objective front lens with gauze slightly moistened with EE-6310 or a mixture of ether (70%) and alcohol (30%).

★ Excessive amounts of alcohol may dissolve the adhesive of the objective.

- ◎ The same procedure is applicable when using a water immersion objective.

# 6 DIFFERENTIAL INTERFERENCE CONTRAST OBSERVATION

## 6-1 Differential Interference Contrast Observation

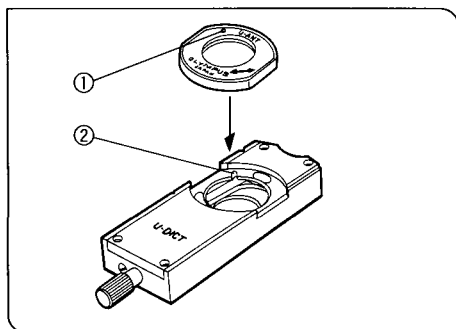


Fig. 94

Universal Condenser (IX-LWUCD)

(Figs. 94 – 99)

### « Installing and Adjusting the Analyzer and Polarizer »

1. Remove the dummy slider from the revolving nosepiece.
2. Align the analyzer (U-ANT) ① and place it into the opening in the transmitted light differential interference contrast slider (U-DICT) ②. (Fig. 94)

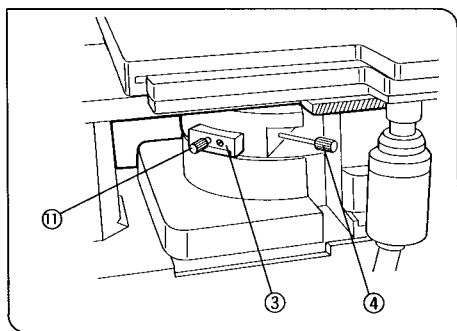


Fig. 95

3. Insert the transmitted light differential interference contrast slider (U-DICT) ③ with the analyzer facing downwards and engage it into the light path. Turn the clamping knob ④ to clamp. (Fig. 95)

⊙ When using the IX-AN analyzer ⑤, insert it into the slider slot ⑥ under the revolving nosepiece. Insert as far as the click-stop. In this case, the analyzer U-ANT is not used. (Figs. 95, 96)

⊙ When performing simultaneous reflected light fluorescence and transmitted light observation, using the IX-AN analyzer will prevent decreased excitation light intensity and make observation of bright images possible.

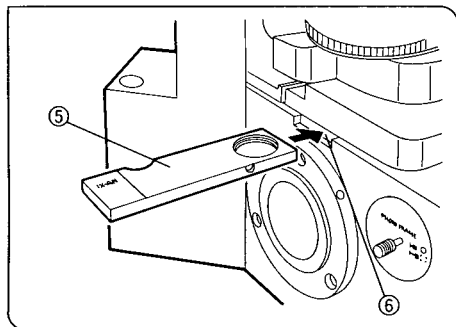


Fig. 96

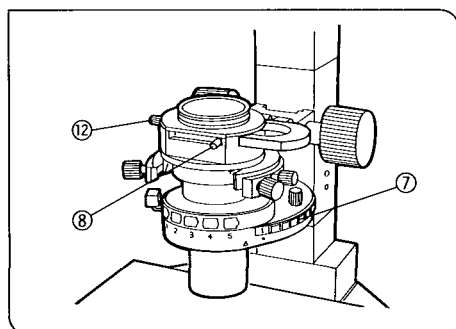


Fig. 97

4. Rotate the condenser turret ⑦ to select the "BF" brightfield observation light path (no optical element in the light path) (Fig. 97).

5. To engage the polarizer into the light path, move the polarizer lever ⑧ on the polarizer unit (IX-LWPO) to the right.

6. Engage the 10X objective and place a specimen suitable for brightfield observation on the stage. After bringing the specimen into approximate focus, remove the specimen from the light path.

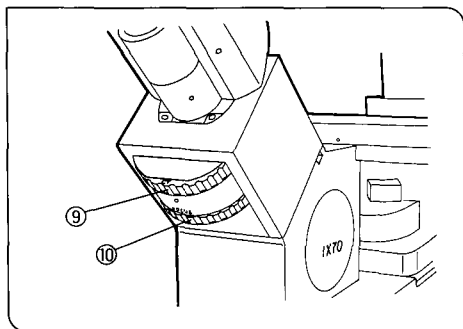


Fig. 98

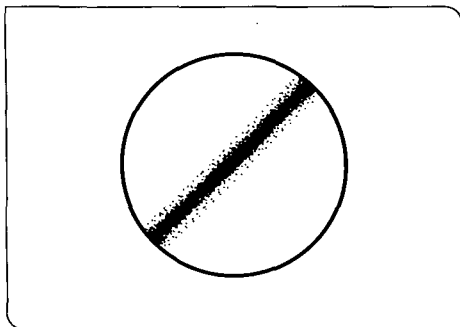


Fig. 99

7. When the binocular observation tube (U-BI90CT) is used, rotate the CT turret ⑨ to the "CT" position to engage the CT lens. (Fig. 98)  
When using the binocular observation tube (U-BI90), or the trinocular observation tube (U-TR30H), replace an eyepiece with the focusing telescope (U-CT30).
  8. Turn the focusing ring ⑩ (the knurled ring in case of the focusing telescope) and bring the objective exit pupil into focus.
  9. When the prism control knob ⑪ of the transmitted light differential interference contrast slider (U-DICT) is rotated all the way in the clockwise direction, the black fringe will be sandwiched between rainbow colored fringes and should go diagonally through the center of the field. (Figs. 95, 99)
  10. While looking at the objective exit pupil, rotate the polarizer slider rotation/clamping knob ⑫ to the position where the black fringe is best defined. (Figs. 97, 98)
- ⊙ The "crossed filter" position (total extinction) should be near the 0° position index.
11. Once the position of the polarizer is determined, tighten the polarizer rotation/clamping knob so that the polarizer does not rotate.

« Observation »

1. Rotate the condenser turret ⑦ to engage the Nomarski prism that matches the objective to be used. (Fig. 97)
- ⊙ See Section 8, OPTICAL TURRET INSERTS AND COMPATIBLE OBJECTIVES, for details on the various optical insert combinations.
2. Engage the objective to be used.
  3. Place the specimen on the stage and move the stage to bring the specimen into focus.
  4. Adjust the field iris diaphragm until the diaphragm opening circumscribes the field of view.
  5. Stopping down the aperture iris diaphragm somewhat will increase the contrast.
  6. Rotate the prism control knob of the DIC prism slider to adjust the interference color of the background, and to achieve maximum contrast depending on the specimen under observation, as outlined below:
    - (1) Rotating the prism control knob of the slider will continuously change the interference color of the background from gray to magenta (200 to 700 nm).
      - If the background color is black ( $\phi$ -order fringe), darkfield like observation is possible.
      - If the background color is gray, a pseudo relief image with maximum contrast with gray sensitivity can be obtained.
      - If the background color is magenta, even a minor optical retardation can be observed as a color change.
    - ★ Care should be taken to keep the specimen surface clean, as even a small amount of contamination on the surface may show up due to the exceptionally high sensitivity of the differential interference contrast method.
    - (2) As differential interference contrast exhibits directional sensitivity, rotate the specimen on the stage as required to obtain maximum contrast.
      - ★ For details on simultaneous reflected light fluorescence and transmitted light observation, refer to the instruction manual for the reflected light fluorescence attachment.
      - ★ If plastic vessels are used, the interference contrast effect is not obtainable due to the de-polarizing effect of plastics.

## 6-2 Simple Polarized Light Observation

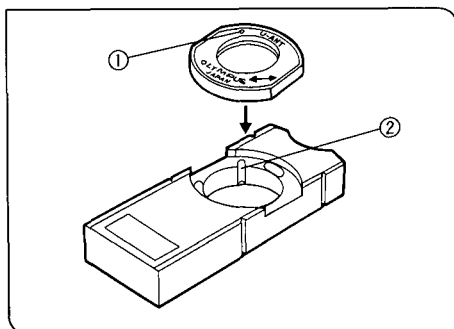


Fig. 100

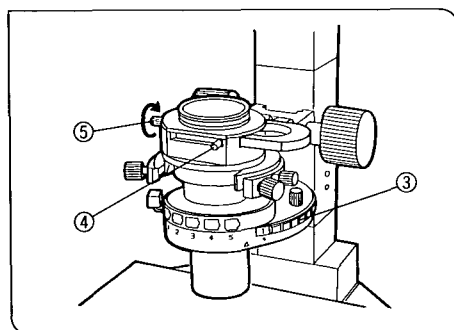


Fig. 101

### Universal Condenser (IX-LWUCD)

(Figs. 100, 101)

1. Remove the dummy slider from the revolving nosepiece.
2. Align the index ① of analyzer (U-ANT) with the groove ② in the dummy slider, and place it into the opening. (Fig. 100)
3. Invert the dummy slider with the mounted analyzer and insert it into the slot under the revolving nosepiece. Insert as far as the click-stop.
4. Rotate the turret ③ to select the "BF" brightfield observation light path (no optical element in the light path). (Fig. 101)
5. To engage the polarizer into the light path, move the polarizer lever ④ on the polarizer unit (IX-LWPO) to the right.
6. Engage the objective to be used.
7. Loosen the polarizer rotation/clamping knob ⑤ a little by rotating it counterclockwise. Move it horizontally until the total extinction position is obtained.
8. When the position of the polarizer is determined, tighten the polarizer rotation/clamping knob to clamp the polarizer.
9. Place the specimen on the stage and bring it into focus. Simple polarized light observation can now be performed.
10. Adjust the field iris diaphragm until the diaphragm opening circumscribes the field of view.
11. Stopping down the aperture iris diaphragm somewhat will increase the contrast.

# 7 PHOTOMICROGRAPHY, TV OBSERVATION

## 7-1 Still Photography

◎ Use a trinocular observation tube (U-TR30H), the side port, or the SLR port (microscope frame IX70 only) for photomicrography.

Photomicrography can be performed using either the PM-10, the PM-20, or the PM-30 photomicrographic system cameras. Procedures for operating the photomicrographic units are described in their respective instruction manuals. Procedures specific to this microscope are described below.

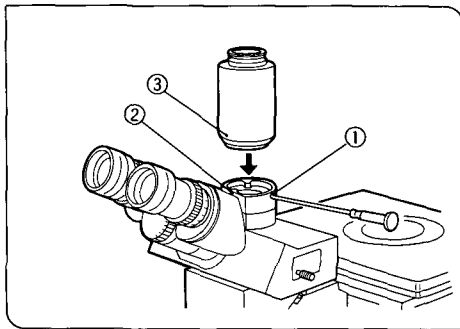


Fig. 102

### 1 Attaching the Straight Photo Tube (IX-SPT) (Figs. 102, 103)

#### Trinocular Observation Tube (U-TR30H) (Fig. 102)

1. Using the Allen screwdriver, loosen the clamping screw ① on the trinocular tube photo port and remove the cap.
2. Align the red index dot ② with the red index dot ③ on the straight photo tube (IX-SPT), then mount the straight photo tube on the trinocular tube photo port.
3. Tighten the clamping screw ①.

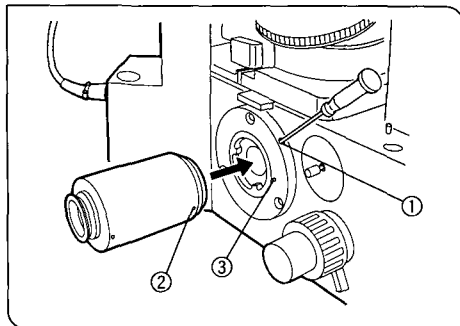


Fig. 103

#### Microscope Frame (IX50/IX70) Side Port (Fig. 103)

1. Using the Allen screwdriver, loosen the clamping screw ① at the microscope frame side port.
2. Align the index dot ② on the straight photo tube (IX-SPT) with the red positioning dot ③ on the side port, then attach the straight photo tube to the side port.
3. Tighten the clamping screw ① firmly.

## 7

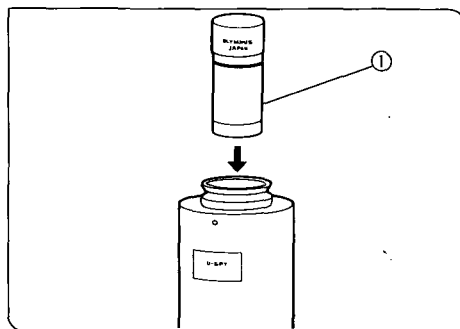


Fig. 104

### 2 Photo Eyepiece (Fig. 104)

Use only a PE photo eyepiece for photomicrography. Insert the photo eyepiece ① of your choice into the straight photo tube.

◎ The SLR port (microscope frame IX70) is equipped with a built-in 2.5X PE photo eyepiece.



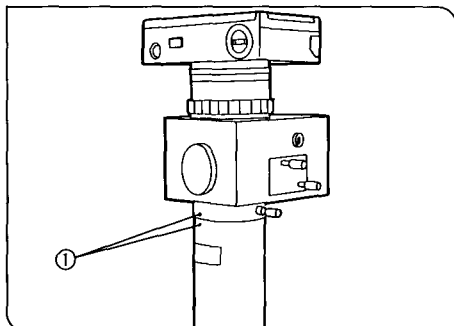


Fig. 105

### 3 Mounting the Camera Unit

(Fig. 105)

- Place the camera unit directly over the circular dovetail of the straight photo tube. Make sure the index dots ● ① on the straight photo tube and the camera unit are aligned, then clamp the unit.
- Mount to the side port in the same manner.
- For details on mounting the SC35 camera to the SLR port, refer to page 14.

### 4 Selecting the Observation Tube Light Path

See page 29 of the "Observation Tube" section.

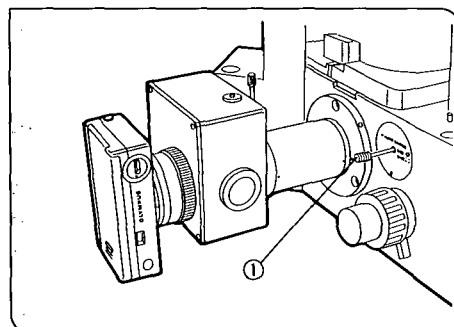


Fig. 106

### 5 Using the Photo Mask

(Figs. 106, 107)

#### Microscope Frame (IX70)

Pull out the photo frame ① to engage the photo mask into the light path for observation. (Fig. 106)

- ⊙ If the photo frame is pulled further out than when placed in the light path for observation, the photo mask slider can be removed from the microscope frame, and dirt or other contaminants can be cleaned off. When mounting the slider, do so with the inscription on the slider facing towards the observer and the positioning pin fitting into the positioning groove.
  - ⊙ The cross-lines in the center of the photo mask are used for eyepiece diopter adjustment.
  - ⊙ The mask indicates the areas covered when using a 35mm film, and the numerals next to the lines correspond to the magnification of the respective PE photo eyepiece. (Fig. 107)
  - ⊙ When using 4"X3" film, the photographed area will be one step smaller than the 35 mm film reticles.
  - ⊙ When using the SLR port for photography, a 2.5X photo magnification will be effective. Accordingly, use the 2.5 masks. The built-in 2.5X photo eyepiece may be replaced with another of different magnification (4X, 5X).
- For details, please consult your Olympus representative.

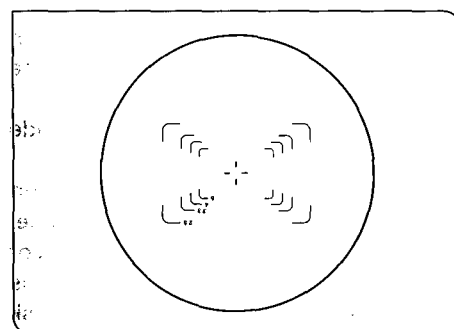


Fig. 107

#### Microscope Frame (IX50)

This microscope frame is not equipped with a photo frame.

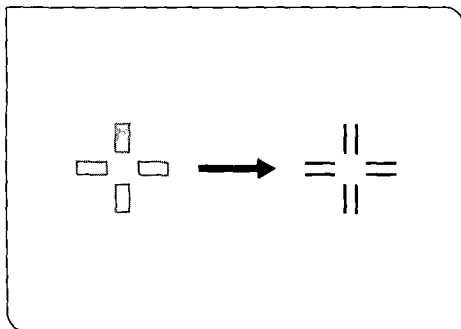


Fig. 108

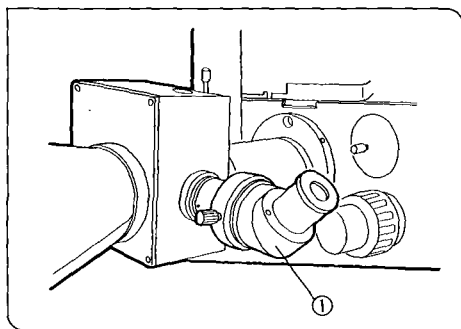


Fig. 109

## 6 Focus Adjustment

(Figs. 108, 109)

- ⊙ Focusing adjustment for photomicrography is performed by using the built-in photo mask of the microscope frame (IX7), or the photo mask of the camera unit's focusing telescope, or by using the photo mask of a finder eyepiece 35WH10X.

★ If no photo mask is used, the film plane may not be in focus, even if the image is in focus in the binocular tube.

### Microscope Frame (IX70)

(Figs. 108, 109)

1. Camera focusing is done using the built-in photo mask of the binocular observation tube.
2. The photo mask has a reticle with four masks and a double cross-line, and the focus is for all purposes the same for the reticle and the camera film plane. The masks indicate the areas covered, and the numerals next to the masks correspond to the magnification of the photo eyepiece. (Fig. 107)
3. Looking through the finder eyepiece, adjust the diopter ring so that the double cross lines can be clearly observed as two distinctly separated lines. (Fig. 108)
4. Using the coarse and fine adjustment knobs, bring the specimen into focus. Since the focusing lens reticles and the film plane are in precise alignment, bring the double cross-lines and the specimen into simultaneous focus using the coarse and fine adjustment knobs.

- ⊙ Because of the great depth of focus of 2.5X to 4X objectives, use an optional focusing magnifier (U-FT) for accurate focusing.

- ⊙ Since it will be difficult to use the standard focusing telescope of the camera unit when attached to the side port, it is recommended to use a V-shaped focusing telescope (U-FTV) ①. (Fig. 109)

★ When using a low power objective, the focusing may be lost when the photo mask is pulled out after use. In this event, focus once again.

Be sure to use the photo mask when adjusting the focus of the side port.

- ★ When the camera unit is attached to the trinocular observation tube, do not use the built-in photo mask of the microscope frame. Be sure to use the finder eyepiece 35WH10X or the photo mask of the camera unit's focusing telescope. When the camera unit is attached to the side port, adjust the focus by using the photo mask of the camera unit's focusing telescope.

### How to Use the U-FTV

- Turn the diopter adjustment ring of the focusing telescope to the +2 index position.
- Slide the top portion of the U-FTV ① up and down until the photo mask is brought into focus. (Fig. 109)

### 《 Photographic Magnification 》

- 35 mm photo magnification  
= Objective magnification X PE photo eyepiece X magnification changer
- Large format camera back magnification  
= 35 mm photo magnification X 3

### Microscope Frame (IX50)

To adjust focus when using this microscope frame, attach a finder eyepiece to the eyepiece portion of the trinocular observation tube, or use the focusing telescope on the camera unit.

When the camera unit is attached to the side port, it is not possible to focus using the 35WH10X. Use the camera unit's focusing telescope. If it is difficult to use the focusing telescope, it is recommended to use a V-shaped focusing telescope (U-FTV).

★ **Note that the finder eyepiece 35WH10X cannot be attached to the binocular tubes U-B190CT, U-B190.**

## 7 Adjusting the Illumination

Correct illumination is more crucial for photomicrography than for observation since flawless pictures cannot be obtained unless the illuminating light is properly adjusted. To avoid uneven illumination, especially with high contrast film, adjust the illuminating light by carefully following the observation procedures.

## 8 Radiant Heat Influence from the Illumination

Even at optimum illumination setting for observation and photomicrography, the illuminating light will generate considerable radiant heat which may damage living specimens. In case of interference contrast observation special caution should be exercised. To prevent this damage, consider the following precautions:

- Reduce light intensity for observation as much as possible.
- Use additional heat absorbing filters for observation.
- For time-laps photography, synchronize the on/off of the light bulb with the exposure (use SYNCHRONOUS mode).

## 9 Filters and Lamp Intensity Setting

Set the lamp intensity and filters in accordance with the film to be used.

Film	Filter	Light intensity adjustment slider
Daylight type color film	45LBD-IF	Camera symbol position
Tungsten type color film	45LBT	Camera symbol position
B & W film	43IF550-W45	Other position than camera symbol position

★ **To match your preference in color rendition, make test exposures for determining the lamp intensity.**

- ◎ When IF550 is not used for color photography of phase contrast images, a neutral color is obtained by combining LBD filters and setting the lamp light intensity at around the lower limit of camera symbol.

## 7-2 TV Observation

◎ The following five methods can be used for TV observation.

1. Attaching the video camera to the side port... To obtain a bright video image with good resolution.
2. Attaching the video camera to the trinocular observation tube (U-TR30H)... To obtain a video image with a high magnification.
3. Attaching the video camera to the SLR port (IX70 only).
4. Attaching the video camera to the bottom port. (Requires modification) (IX70 only)
5. Attaching the video camera to a right hand side port. (Requires modification) (IX70 only).

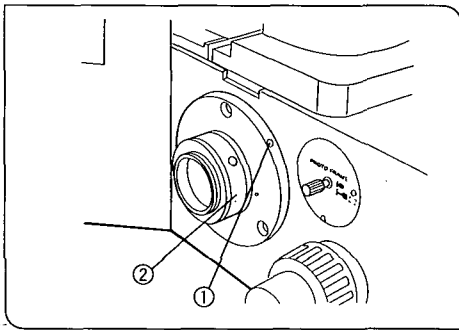


Fig. 110

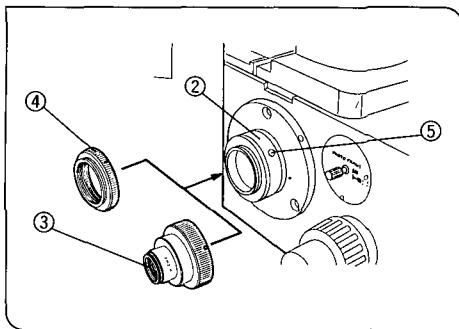


Fig. 111

### 1 Attaching the Video Adapter to the Side Port (Figs. 110, 111)

1. Loosen the side port clamping screw ① using the Allen screwdriver.
2. Fit the video adapter (IX-TVAD) ② onto the side port and tighten the clamping screw ①. (Fig. 110).
3. Firmly screw the C/T-mount adapter (U-CMT) ③ or F/T-mount adapter (U-FMT) ④ onto the video adapter (IX-TVAD) ②. (Fig. 111)
4. Attach a video camera compatible with U-CMT or U-FMT.

#### 《 Adjustment of observation image and monitor image 》

1. Adjust the eyepiece to bring the specimen into focus.
2. Lightly loosen the clamping screws ①, ⑤. (Figs. 110, 111)
3. While observing the monitor image and holding the U-CMT ③ or U-FMT ④ stationary, rotate IX-TVAD ②. Tighten the clamping screws ① and ⑤ when the image is in focus. (Figs. 110, 111)
- ★ If the clamping screw ⑤ is facing downwards and is difficult to tighten, loosen the screw ① and then hold only the IX-TVAD and rotate it until the screw ⑤ faces upward. Then, tighten the screw ⑤. Next, rotate to the original position and tighten the screw ①.

## 7

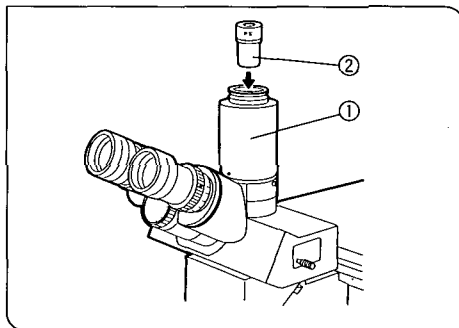


Fig. 112

### 2 Attaching the Video Adapter to the Trinocular Observation Tube (U-TR30H) (Fig. 112)

1. Attach the adapter in the same manner as outlined on page 44, "1. Attaching Photographic Tube (IX-SPT)."
2. Insert the PE photo eyepiece ② into IX-SPT ①, and attach the video adapter for the Olympus video system.
3. Mount a video camera compatible with the video adapter. (Refer to the instruction manual provided with the video system.)

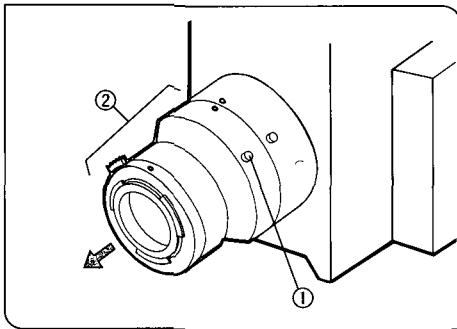


Fig. 113

### 3 Attaching the Video Adapter to the SLR Port (Figs. 113,114)

#### Microscope Frame (IX70)

1. Using the Allen screwdriver, loosen the two clamping screws ① holding the intermediate body of the OM adapter on the SLR port. Remove the front section ② of the adapter. (Fig. 113)
2. The rear section of the adapter is provided with a thread ③ for mounting a T-mount. Firmly screw a C/T-mount adapter (U-CMT) ④ or an F/T-mount adapter (U-FMT) onto the thread. (Fig. 114)

◎ A commercially available T-ring (mfd. by Vixen) may also be used.

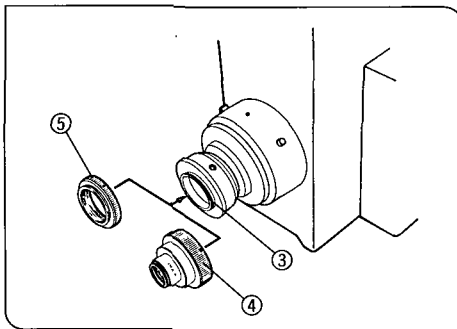


Fig. 114

### 4 Attaching the Video Adapter to the Bottom Port

Modification is required to attach the video adapter to this port. For details, please consult your Olympus representative.

### 5 Attaching the Video Adapter to the Right Hand Side Port

Modification is required to attach the video adapter to this port. For details, please consult your Olympus representative.

## 6 TV Observation

1. Adjusting the microscope frame  
Turn on the light source and perform all the required adjustments for observation.
2. Adjusting the video camera/monitor  
Perform white balance and color adjustments as required.  
★ The center of the eyepiece and the center of the monitor may not match. However, this is a problem with the video camera's mechanism for adjustment.
3. Simultaneous focusing of the observed image and the monitor image  
In accordance with the adjustment method of each video adapter, adjust for simultaneous focusing of the observed image and the monitor image.

### « TV Observation Magnification »

$$\begin{aligned} \text{TV observation magnification} &= \text{Objective magnification} \\ &\times \text{Video adapter lens magnification} \\ &\times \frac{\text{Video monitor size}}{\text{Video camera format}} \end{aligned}$$

# 8 TURRET INSERTS AND COMPATIBLE OBJECTIVES

Condenser	Observation method	Turret insert	Turret insert replacement	Compatible objectives
IX-LWUCD	Phase contrast (Note 1)	IX-PHL (S)	○	UPlanFI 4XPh CPlan10XPh, LCAch20XPh, CPlanFI10XPh UPlanFI10XPh, UPlanFI20XPh, LCPlanFI20XPh, UPlanApo10XPh UPlanFI40XPh, LCPlanFI40XPh, LCPlanFI60XPh, UPlanApo20XPh LCAch40XPh UPlanFI100XOPh, UPlanApo40XOIPh, UPlanApo100XOIPh, PlanApo60XOPh
		IX-PHC (S)	○	
		IX-PH1 (S)	○	
		IX-PH2 (S)	○	
		IX-PH3 (L)	○	
IX-LWUCD	Differential interference contrast	IX-DP10 (S)	○	UPlanFI10XUPlanApo10X LCPlanFI20X LCPlanFI40X, UPlanApo40X LCPlanFI60X UPlanApo60XWPSF UPlanFI100Xo, UPlanApo100Xo
		IX-DP20 (S)	○	
		IX-DP40 (L)	○	
		IX-DP60 (L)	○	
		IX-DPO60 (L)	○	
		IX-DP100 (L)	○	
Brightfield	—	—	NA 0.13 – 0.9 objectives (Note 2)	
IX-ULWCD	Phase contrast	PHL (built-in)	X	UPlanFI4XPh CPlan10XPh, LCAch20XPh, CPlanFI10XPh UPlanFI10XPh, UPlanFI20XPh, LCPlanFI20XPh, UPlanApo.10XPh UPlanFI40XPh, LCPlanFI40XPh, LCPlanFI60XPh, UPlanApo20XPh, LCAch40XPh
		IX-PHCU	○	
		IX-PH1U	○	
		PH2 (built-in)	X	
Brightfield	—	—	—	Magnification 2.5X or more and NA 0.75 or lower objectives
IX-SLWCD	Phase contrast	PHL (built-in)	X	UPlanFI4XPh CPlan10XPh, LCAch20XPh, CPlanFI10XPh
		PHC (built-in)	X	
Brightfield	—	—	—	Magnification 2.5X or more and NA 0.3 or lower objectives

Note 1: Small diameter turret inserts (S) should be placed in the 30 mm diameter turret opening, and large diameter turret inserts (L) should be placed in the 38 mm diameter turret opening.

Note 2: When combined with an objective of NA 0.3 or higher, the resolution may decrease somewhat. For a well observation, the phase contrast effect can be obtained in a large area of the field of view when the PHC is used.

# 9 SPECIFICATIONS

	Item	Specifications
Microscope frame	IX70-S8F2 IX70-S1F2	3-step light path selector (shockless design):  S8F2: Side port 80% S1F2: Side port 100% SLR port (single-lens reflex), built-in intermediate mag. (1X, 1.5X) lens, built-in photo mask, sextuple revolving nosepiece, aberration corrected 1X image (side port), revolving nosepiece vertical stroke: 7 mm upward, 2 mm downward, with reduction gear, graduated in increments of 1 $\mu$ .
	IX50-S8F IX50-S1F	2-step light path selector (shockless design):  S8F: Side port 80% S1F: Side port 100% No SLR port, no built-in intermediate mag. lens, sextuple revolving nosepiece, aberration corrected 1X image (side port), revolving nosepiece vertical stroke: 7 mm upward, 2 mm downward, with reduction gear, graduated in increments of 1 $\mu$ .
Illumination column	IX-ILL100LH	Column with lamp housing, 30° inclinable mechanism, tilting condenser holder, 100W halogen bulb, pre-centered.
	IX-ILL30	30W halogen column, for use with condenser IX-ULWCD or IX-SLWCD.
Observation tube	U-BI90CT	Binocular tube, 45° tube inclination, built-in CT, one eyepiece sleeve with diopter adjustment, 2-step eyepoint: 400 mm or 430 mm
	U-BI90	Binocular tube, 45° tube inclination, one eyepiece sleeve with diopter adjustment, 2-step eyepoint: 400 mm or 430 mm
	U-TR30H	Trinocular tube, 30° tube inclination, mounted by means of intermediate tube IX-ATU.
Condenser	IX-LWUCD	NA 0.55, WD 23 mm, 5-aperture turret
	IX-ULWCD	NA 0.3, WD 73 mm, 4-aperture turret
	U-UCDB	Dry: NA 0.9, WD 1.5 mm Oil: NA 1.4, WD 0.63 mm
Stage	IX-SFR	Right low positioned coaxial knobs, flexible stalk, movement range: 50 mm x 50 mm; stage insert plate diameter: 110 mm
	IX-SVL	Left low positioned coaxial knobs, movement range: 43 mm (Y) x 50 mm (X); stage insert plate diameter: 110 mm
	IX-SP/IX-MVR	Size: 240 mm (Y) X 232 mm (X); stage insert plate diameter: 110 mm; movement range: 87 mm (Y) x 132 mm (X); low positioned coaxial knobs, flexible stalk.
Eyepiece	WH10X	Field number 22
	WH10X-H	Field number 22, with diopter adjustment helicoid.
	35WH10X	Field number 22, with photo mask and diopter adjustment helicoid.

	Item	Specifications
Objective	Achromatic phase contrast CPlan10XPh CPlanF110XPh LCAch20XPh LCAch40XPh	NA 0.25, WD 9.8 mm, ring slit IX-PHC, PHCU NA 0.3, WD 9.5 mm, ring slit IX-PHC, PHCU NA 0.4, WD 3 mm, ring slit IX-PHC, PHCU NA 0.55, WD 1.2 mm, ring slit IX-PH2



	Item	Specifications	
Objective	Plan semi apochromat phase contrast	UPlanFI4XPh UPlanFI10XPh LCPlanFI20XPh LCPlanFI40XPh LCPlanFI60XPh	NA 0.13, WD 17 mm, ring slit IX-PHL NA 0.3, WD 10 mm, ring slit IX-PH1, PHCU NA 0.4, WD 6.9* mm, ring slit IX-PH1, PH1U, correction cap system NA 0.6, WD 2.6* mm, ring slit IX-PH2, correction cap system with correction collar NA 0.7, WD 1.7* mm, ring slit IX-PH2, correction cap system with correction collar
	Plan semi apochromat DIC brightfield	UPlanFI10X LCPlanFI20X LCPlanFI40X LCPlanFI60X	NA 0.3, WD 10 mm NA 0.4, WD 6.9* mm, correction cap system NA 0.6, WD 2.6* mm, correction cap system with correction collar NA 0.7, WD 1.7* mm, correction cap system with correction collar
	Brightfield high resolution DIC	PlanApo60XO UPlanFI100XO UPlanApo100XOI	NA 1.4, WD 0.1 mm NA 1.3, WD 0.1 mm NA 1.35, WD 0.1 mm, with iris diaphragm
	Apochromat reflected light fluorescence Fura-2	UPlanApo10X UApo20X/340 UApo40X/340 UApo40XOI/340	NA 0.4, WD 3.1 mm NA 0.75, WD 0.55 mm, with water-proof cap NA 0.9, WD 0.2 mm, with water-proof cap NA 1.35, WD 0.1 mm, with iris diaphragm and water-proof cap
	Water immersion objective	UPlanApo60Xw	NA 1.2, WD 0.25 mm, correction collar range: 0.15 - 0.19 mm

\*When the correction cap for standard culture vessel is used.

Main Frame Electrical System	IX70-S8F2 IX70-S1F2	Brightness adjustment range: DC 1.0 - 11.9 V (continuous), with light-off switch Power requirements: 100-120V/220-240V $\sim$ 1.8A/0.8A 50/60 Hz Rated output: 12V 100W Bulb used: 12V 100W Halogen lamp PHILIPS 7724 Average life time of bulb: approx. 2,000 hr. Applicable fuse: $\equiv$ T5A(H) 250V (LITTEL FUSE 215005)
	IX50-S8F2 IX50-S1F2	Brightness adjustment range: DC 1.0 - 5.9 V (continuous) Power requirements: 100-120V/220-240V $\sim$ 0.8A/0.4A 50/60 Hz Rated output: 6V 30W Bulb used: 6V 30W Halogen lamp PHILIPS 5761 Average life time of bulb: approx. 100 hr. Applicable fuse: $\equiv$ T3.15A(H) 250V (LITTEL FUSE 2153.15)
	Operation environment	<ul style="list-style-type: none"> <li>• Indoor use</li> <li>• Altitude up to 2000 m</li> <li>• Temperature: 5° to 40°C (41° to 104°F)</li> <li>• Maximum relative humidity 80% for temperatures up to 31°C (88°F) decreasing linearly to 50% relative humidity at 40°C (104°F)</li> <li>• Main supply voltage fluctuations not to exceed <math>\pm</math>10% of the nominal voltage</li> <li>• Installation/Overvoltage Category II (In accordance with IEC664)</li> <li>• Pollution Degree 2 (In accordance with IEC664)</li> </ul>

# 10 TROUBLESHOOTING GUIDE

Under certain conditions, performance of this unit may be adversely affected by factors other than defects. If problems occur, please review the following list and take remedial action as appropriate. If you cannot solve the problem after checking the entire list, please contact your local Olympus representative for assistance.

Problem	Cause	Remedy	Page
1. Bulb does not light.	Light-off switch is set to ON. (IX70 only)	Set light-off switch to OFF. (IX70 only)	22
	Bulb burned out.	Replace bulb.	4,5
	Fuse burned out.	Replace fuse.	15
2. Bulb lights, but field of view remains dark	Line voltage selector switch is not set to conform with local mains voltage. (IX50 only)	Set the switch to the position matching the local line voltage (100-120V or 220-240V). (IX50 only)	15
	Light intensity lever is in low position.	Set lever to appropriate position.	22
	Condenser is not in correct position.	Adjust the condenser height until the field iris diaphragm image is formed in the specimen plane.	34
	Condenser is not centered.	Center the condenser until the field iris diaphragm image is centered in the field of view.	34
	The revolving nosepiece is not correctly engaged.	Make sure that the revolving nosepiece clicks properly into place.	—
	The light path selector knob is set to SLR port or side port.	Set the knob to binocular eyepieces or raise the lamp voltage.	23
	Too many filters are engaged.	Reduced the number of filters to the minimum required.	32
	The stage insert plate blocks the light path.	Move the stage and place the specimen again.	25
	Field iris diaphragm is not opened wide enough.	Open the field iris diaphragm sufficiently.	33
	Trinocular tube light path selector knob is set to pulled-out position.	Set the knob at intermediate or pushed-in position.	29
	The U-BI90CT turret position is "S".	Rotate the turret to the "0" position	30
3. Field of view is obscured, or field of view is not evenly illuminated	Trinocular tube light path selector knob is in middle position.	Fully engage the knob at the click-stop corresponding to the observation method.	29
	An objective that falls outside of the condenser's illumination range is used.	Use a condenser that matches the objective.	51
	The field iris diaphragm is not properly centered.	Center the field iris diaphragm correctly.	34
	The field iris diaphragm is stopped down too far.	Open the field iris diaphragm sufficiently.	33
	Light path selector knob on the frame is in middle position.	Fully engage the knob at the click-stop corresponding to the observation method.	29
	Magnification selector knob (IX70 only) is in middle position.	Fully engage the knob at the click-stop corresponding to the observation method.	23
	The revolving nosepiece or magnification selector knob (IX70 only) is in middle position.	Fully engage the knob at the click-stop.	23
	The condenser turret is not correctly engaged.	Engage the condenser turret at a click-stop.	—
	Filter is not engaged correctly.	Set filter at appropriate position.	—
	Frosted filter is not inserted.	Insert the frosted filter.	32
4. Dirt or dust is visible in the field of view.	Dirt/dust on specimen.	Clean thoroughly.	—
	Dirt/dust on eyepiece.		
	Dirt on photo mask.		
	Dirt on mirror cube.		
	Dirt on turret insert.		
	Condenser is not correctly positioned and the frosted filter, etc. is in focus.	Adjust the condenser height until the field iris diaphragm image is formed in the specimen plane.	34

Problem	Cause	Remedy	Page
5. The image shows diffraction	Condenser is raised too high.	Lower to the proper position.	34
	The aperture iris diaphragm is stopped down too far.	Open the aperture iris diaphragm.	37
6. Visibility is poor. • Image is not sharp. • Contrast is poor. • Details are indistinct.	You are using a non-UIS series objective.	Use only UIS series objectives with this microscope.	52,53
	The correction collar on the correction collar equipped objective is not adjusted.	While focusing, turn the correction collar to find the best position.	39
	Front lens of the objective is dirty.	Clean the objective.	—
	Immersion oil is not being used with an oil immersion objective.	Use immersion oil.	40
	The immersion oil contains bubbles.	Remove bubbles.	—
	Inappropriate slide or cover glass thickness.	Replace with glass of appropriate thickness.	—
	Dirty condenser, objective, eyepiece, culture vessel, etc.	Clean thoroughly.	—
	Ring attachment and phase plate are not centered.	Center correctly.	36
	Poor contrast during differential interference contrast observation.	Replace plastic culture vessel with glass vessel.	—
7. Part of the image is blurred.	The objective is not correctly engaged in the light path.	Make sure that the revolving nosepiece clicks into place correctly.	—
	The specimen is not placed flat on the stage.	Place the specimen correctly on top of the stage and secure it with the specimen holder.	6,7
8. The coarse and fine adjustment knobs are hard to turn.	The tension adjustment ring is tightened excessively.	Loosen the ring.	24
	You are trying to raise the revolving nosepiece with the coarse adjustment knob even though the prefocusing lever is locked.	Unlock the prefocusing lever.	24
9. The revolving nosepiece drifts down by itself, or focus is lost during observation.	The tension adjustment ring is too loose.	Tighten the ring.	24
10. Coarse adjustment will not go all the way up.	Prefocusing lever is keeping the revolving nosepiece down.	Unlock the lever.	24
11. Field of view of one eye does not match that of the other.	The interpupillary distance is incorrect.	Adjust the interpupillary distance.	28
	Incorrect diopter adjustment.	Adjust the diopter setting.	28,29
	The optical axes are not parallel.	Upon looking into the eyepieces, try looking at the overall field before concentrating on the specimen range. You may also find it helpful to look up and into the distance for a moment before looking back into the microscope.	—

This device complies with the requirements of both directive 89/336/EEC concerning electromagnetic compatibility and directive 73/23/EEC concerning low voltage. The CE marking indicates compliance with the above directives.

## ■ PROPER SELECTION OF THE POWER SUPPLY CORD

If no power supply cord is provided, please select the proper power supply cord for the equipment by referring to "Specifications" and "Certified Cord" below:

**CAUTION:** In case you use a non-approved power supply cord for Olympus products, Olympus can no longer warrant the electrical safety of the equipment.

### Specifications

Voltage Rating	125V AC (for 100-120V AC area) or, 250V AC (for 220-240V AC area)
Current Rating	6A minimum
Temperature Rating	60°C minimum
Length	3.05 m maximum
Fittings Configuration	Grounding type attachment plug cap. Opposite terminates in molded-on IEC configuration appliance coupling.

Table 1 Certified Cord

A power supply cord should be certified by one of the agencies listed in Table 1, or comprised of cordage marked with an agency marking per Table 1 or marked per Table 2. The fittings are to be marked with at least one of agencies listed in Table 1. In case you are unable to buy locally in your country the power supply cord which is approved by one of the agencies mentioned in Table 1, please use replacements approved by any other equivalent and authorized agencies in your country.



















Country	Agency	Certification Mark	Country	Agency	Certification Mark
Australia	SAA		Italy	IMQ	
Austria	ÖVE		Japan	MITI	
Belgium	CEBEC		Netherlands	KEMA	
Canada	CSA		Norway	NEMKO	
Denmark	DEMKO		Spain	AEE	
Finland	FEI		Sweden	SEMKO	
France	UTE		Switzerland	SEV	
Germany	VDE		United Kingdom	ASTA BSI	
Ireland	NSAI		U.S.A.	UL	

Table 2 HAR Flexible Cord

## APPROVAL ORGANIZATIONS AND CORDAGE HARMONIZATION MARKING METHODS

Approval Organization	Printed or embossed Harmonization Marking (May be located on jacket or insulation of internal wiring)		Alternative Marking Utilizing Black-Red-Yellow Thread (Length of color section in mm)		
			Black	Red	Yellow
Comite Electrotechnique Belge (CEBEC)	CEVEC	<HAR>	10	30	10
Verband Deutscher Elektrotechniker (VDE) e.V. Prüf stelle	<VDE>	<HAR>	30	10	10
Union Technique de d'Electricite' (UTE)	USE	<HAR>	30	30	10
Instituto Italiano del Marchio di Qualita' (IMQ)	IEMMEQU	<HAR>	10	30	50
British Approvals Service for Electric Cables (BASEC)	BASEC	<HAR>	10	10	30
N.V. KEMA	KEMA-KEUR	<HAR>	10	30	30
SEMKO AB Svenska Elektriska Materielkontrollanstalter	SEMKO	<HAR>	10	10	50
Österreichischer Verband für Elektrotechnik (ÖVK)	<ÖVE>	<HAR>	30	10	50
Danmarks Elektriske Materielkontrol (DEMKO)	<DEMKO>	<HAR>	30	10	30
National Standards Authority of Ireland (NSAI)	<NSAI>	<HAR>	30	30	50
Norges Elektriske Materielkontroll (NEMKO)	NEMKO	<HAR>	10	10	70
Asociacion Electrotecnica Y Electronica Espanola (AEE)	<UNDE>	<HAR>	30	10	70
Hellenic Organization for Standardization (ELOT)	ELOT	<HAR>	30	30	70
Instituto Portugues da Qualidade (IPQ)	np	<HAR>	10	10	90
Schweizerischer Elektro Technischer Verein (SEV)	SEV	<HAR>	10	30	90
Elektriska Inspektoratet	SETI	<HAR>	10	30	90

Underwriters Laboratories Inc. (UL)

SV, SVT, SJ or SJT, 3 X 18AWG

Canadian Standards Association (CSA)

SV, SVT, SJ or SJT, 3 X 18AWG

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